AMERICAN DYESTUFF REPORTER

SAMPLE SWATCH QUARTERLY

"Circulated Everywhere Dyestuffs Are Used"

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Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

NEW YORK, JANUARY 21, 1929

Bleaching Cotton With Hydrogen Peroxide

Cause of Difficulties in Peroxide Bleaching—No Absolute Method—Use of Silicate—Description of the Process

By H. G. SMOLENS

Consulting Engineer, Buffalo Electro Chemical Company, Inc.

ANY grade of cotton which can be bleached at all can be bleached at least as well, almost always more easily and in many cases as cheaply with hydrogen peroxide as with any other bleaching chemical. However, it is only within the past year or so that this has been proved in a sufficient number of instances to allow its general acceptance.

The fundamental properties of cotton are not changed when it is spun into yarn or when this yarn becomes woven or knit. Therefore, exactly the same hydrogen peroxide bleach formula that will bleach a cotton stock will bleach yarn and cloth made from it, provided they are cleaned of artificial oils, sizes, etc., and provided similar bleaching equipment is used.

What usually causes difficulties in peroxide bleaching is not so much the bleaching itself as the attempt to use a formula or process that is right for one particular machine, then to bleach in another machine that is entirely different in its physical and mechanical action.

It is a comparatively simple matter to put a beautiful bleach on a small piece of sateen, for example, by treating it with a hydrogen peroxide solution in a glass beaker. A similar solution, however, will probably not give much of a bleach on several tons of sateen, if used in a center vomit kier.

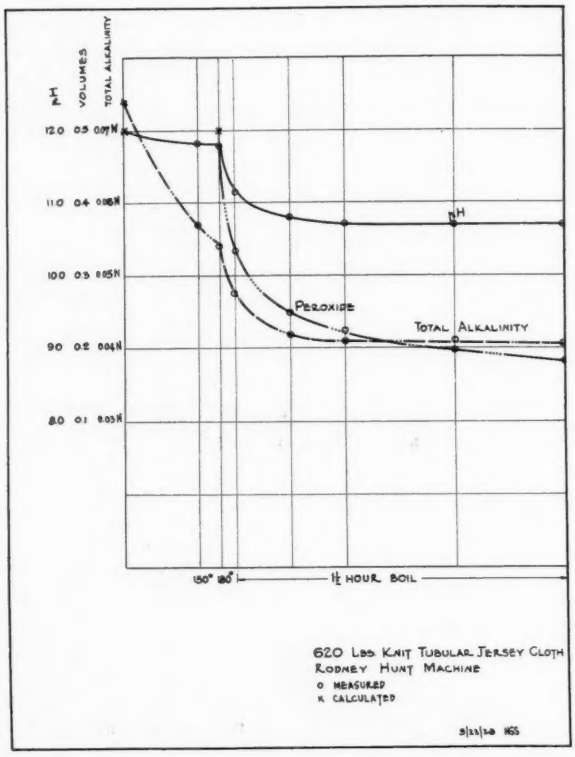
This is no indication that sateen cannot be bleached successfully with hydrogen peroxide in such a kier.

There is no "absolute" method of bleaching cotton with hydrogen peroxide. Any number of alkaline peroxide solutions may be made up which will produce the same whiteness on a particular cotton. But they will require different amounts of time and will show different chemical costs for doing the same work. Therefore, the ideal formula for bleaching a cotton is the one which does the required work in the least time at the lowest chemical cost. There are, of course, other considerations, but they are of individual bleachhouse importance only.

A bleach liquor consisting of hydrogen peroxide and caustic soda would be the simplest and cheapest to use; but, for reasons which have been known only a short time, it will not do the work. The proper use of silicate of soda with the hydrogen peroxide and caustic soda is, so far as is now known, the fundamental basis of successful peroxide bleaching of cotton. This has been worked out on a practical basis and is now available to all bleachers.

The process herein described applies to the bleaching of ordinary American, Indian or China cotton in a hydrogen peroxide solution, when thorough, positive penetration and circulation are obtainable, and when the weight ratio of cotton to bleach liquor is not greater than 1:6.

The cotton, in the gray, having been cleansed, or desized if necessary, is put into the bleach machine, the required amount of cold water is added, the steam turned on full and the movement of the cotton or water started. When the water is warm, sufficient silicate of soda is added to make an alkaline solution about 0.037 N. Then caustic soda is added to a pH = 12.0. When the temperature is 180° F., ½ gallon of hydrogen peroxide 100 volume is added for each 100 gallons of water and the liquor is quickly brought to a boil (210° F.) and held at a boil for one and one-half to two hours. Then the steam is shut off, the liquor



run out and the cotton rinsed and finished as desired.

The accompanying curves show the action of the bleach liquor during the course of the entire process.

This process may be applied to bleaching raw stock in most types of dyeing machines; to bleaching yarns in open tubs or in yarn-dyeing machines; to bleaching knit tubing in string-washing machines; to bleaching hosiery in various hosiery-dyeing machines, and to bleaching woven cloth on dye becks, on jigs or in cloth-washing machines.

TEXTILE IMPORTS AND EXPORTS

Silk and Rayon Figures for November

According to the tabular reports distributed by the Department of Commerce on imports of silk and rayon for November, 1928, shipments of the former were higher than one year ago, while rayon imports were slightly lower. Of raw silk, 5,858,000 pounds came in during November, 1928; imports for the eleven months of 1928 ending November totaled 69,293,197 pounds, as compared with 67,313,622 pounds in 1927. The total of silk manufactures brought in during November was in excess of 2,833,000 pounds; during the eleven months' period silk manufactures were imported to the sum of 38,549,000 pounds.

Rayon imports for November totaled 1,267,877 pounds; for the eleven months' period, January to November, 1928, the total for rayon is given as 13,762,000.

NEW ENGLISH CUPRATE FACTORY WITH $5,500,000 CAPITAL

Birthday Banquet to Count Callimachi, Father of Cuprate Rayon

(*Special from* FRED. GROVE-PALMER)

COUNT MICHAEL THEO. CALLIMACHI, D.Sc., was the guest of honor at a banquet held in London in October to celebrate his seventieth birthday.

The Count, a remarkably young-looking man for his years, was introduced by Chairman S. S. Hammersley, Member of Parliament for Stockport, England, as being one of the fathers of rayon, having been a colleague of the late Count de Chardonnet in his original work with nitro-rayon in 1888. "It was," he said, "a long call from the primitive nitro-cellulose of that year to the modern alternative which Count Callimachi has spent the major part of his life in helping to evolve. So faithful to real silk is cuprate rayon that at Frankfort recently a hundred buyers were asked to distinguish between it and silk, and only nine were able to detect the difference."

It was announced that a factory capable of producing 1,000 long tons of cuprate rayon is to be erected in Kendal, England, by a company having a capital of $5,500,000, "and we are honored in having with us the Mayor-elect of that town. In the past the prosperity

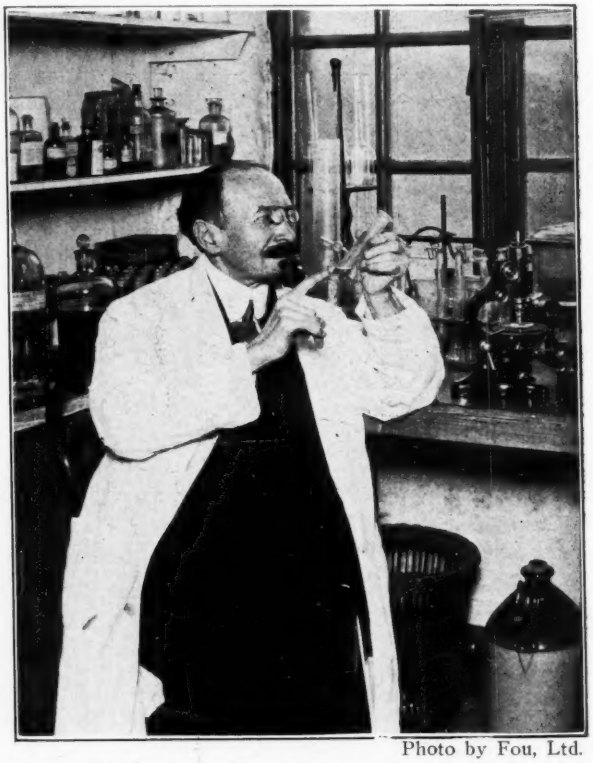


Photo by Fou, Ltd.

Count Michael Theodore Callimachi, D.Sc., at the Age of Seventy

of England was assured, because we were the workshop of the world; now prosperity cannot be maintained unless we are the best workshop in the world. The luxuries of one generation become the necessities of the next.

"Sometimes one hears rumors of overproduction, but the world's production of rayon of all kinds is less than 4% of the consumption of cotton; it requires little imagination to anticipate the tremendous field of expansion available for the rayon industry. When overproduction does come, it seems most likely that it will come in the coarser and cheaper qualities. British cuprammonium silk spinners will concentrate on the production of higher class yarns; cuprate gives much finer counts than viscose; by the stretch-spinning methods filaments as fine as 1.4 denier can be produced, and even finer counts are anticipated."

Count Callimachi, who was until the middle of last year a member of the scientific staff of Courtauld's, Ltd., said, in reply, that he claimed to have had more influence on feminine fashion than all the great dress designers of Paris put together. With Count de Chardonnet he was responsible for the working model of a nitro-rayon plant at the Paris Exposition of 1889; it was very crude and they constantly feared a breakdown, but fortune favored them. It created a furore which is to-day reflected in the delightful materials which adorn the women of Europe, America, Asia, and even Africa—for the dusky belles of the dark continent have been quick to react to the brilliant colors and tones of rayon goods.

He had persuaded Countess Callifachi to weight the clothes she proposed wearing in the home; her attire weighed one and a half pounds. This was compared with the volume of clothes that her grandmother wore; the voluminous petticoats, the dress, stockings, the underclothes all of wool. Rayon has justified his claim that he has helped revolutionize feminine apparel.

Men have been more conservative, but young men and men who feel young now use rayon socks, shirts, underclothes, ties, suit-linings and tropical wear, and it is even woven into suits.

Although rayon was first made over forty years ago, it is really only within the last ten years that its use has become general.

The problem up to recent years was to get machinery capable of spinning the new fiber without undue breakage; so slight was the confidence of spinning machinery engineers in the future of rayon that they refused to interest themselves; but this has all been changed and the machinery has reached a high state of efficiency.

Rayon is differentiated from silk by its metallic luster and a lack of elasticity. As long ago as 1890, Despeissis, when filtering a solution of copper in ammonia, discovered that the filter paper he was using was being dissolved away by the liquid. He realized that by the merest accident he had stumbled upon a process with great potentialities, and it is to this process that Count Callimachi has devoted considerable time and attention during the past thirty-eight years. Always he has had the greatest confidence in cuprate rayon because, having examined closely every other sort of rayon produced within the last forty years, he believes cuprate to possess advantages over the others; it is very similar to silk in its luster, its elasticity and its draping qualities.

For many years experiments were failures from a commercial standpoint; the waste of copper and the inefficiency of the existing machinery were so great that the cost per pound of manufactured cuprate was out of all proportion to its value in the market. But success came at last, and he can now produce cuprate rayon without the excessive loss of copper, in filaments of a surprising fineness, as cheaply as viscose and of infinitely better quality.

He had agreed to act as scientific advisor to the new company. One of the prime difficulties was to find a site with a necessary available supply of pure water, for an output of 1,000 tons of cuprate calls for twelve hundred million gallons of water, each pound of finished yarn requiring no less than 480 gallons of water for its purification. Just the right site was found at Kendal, Westmoreland, where they have secured eighty-three acres of land with ample water rights.

Production will begin as soon as the plant is erected and equipped, and Count Callimachi considered himself fortunate to be able to see in the near future the realization on a commercial scale of what the unbelievers have called for many years past "The Cuprammonium Dream."

Mayor-elect N. E. Wilson also spoke on behalf of the city of Kendal, which he pointed out as noted in history as the home of the dye known as "Kendal Green" and the snuff called "Kendal Brown"; the first of these was mentioned by Shakespeare.*

He laid special stress upon the need to erect not only a practical factory but also a beautiful one which would not spoil the scenic amenities of the most beautiful city of its size in the Kingdom.

*First part King Henry IV, Act II, Scene 4.

SIXTEEN COUNTRIES BUY OUR LOGWOOD

According to export figures tabulated by the Department of Commerce for the month of October, and just released, sixteen foreign countries in addition to Hawaii and Porto Rico purrchased Logwood and other dyeing and tanning extracts from the United States during that month. The amount of Logwood exported in October totaled 205,450 pounds, valued at $24,461. Other dye extracts were shipped abroad to the sum of 25,300 pounds, valued at $2,717 for the month.

TARIFF HEARINGS ON DYES CONCLUDED BEFORE HOUSE COMMITTEE

Higher Rates Asked by Domestic Industry—American Selling Price Argued—Other Chemicals Considered in Three-Day Session

REVISION of the tariff schedules on dyes and other coal-tar chemicals, so long urged, may soon become more than a faint hope. The present tariff needs of the American chemical industry as well as the dissenting arguments of one or two importers were well aired before the Ways and Means Committee at its hearings on tariff readjustment held in Washington, January 7, 8 and 9. The outcome of these hearings may be of vital concern to our textile industry.

The hearings on Schedule I of the Fordney-McCumber tariff, which schedules cover chemicals, oils and paints, were the first of those to be held during this month and February. Later sessions will cover textiles and many other products.

Many of the briefs presented by witnesses representing domestic chemical manufacturers were lengthy, carefully constructed and convincing. It was quite evident that the industry as a whole put into practice its belief in preparedness on matters so directly affecting its welfare as tariff protection.

The case for protection of the domestic dye and coal-tar products industry was laid before the committee on Tuesday, January 8, by Dr. E. H. Killheffer, who represented the Synthetic Organic Chemical Manufacturers' Association, the Manufacturing Chemists' Association and his own company, Newport Chemical Works. On the previous day a number of manufacturers of fine and heavy chemicals had testified on various specific products and general sections of the tariff law. In practically every case the main arguments were, first, in support of the present system of assessing duty for competitive products on the basis of the American selling price rather than United States or foreign value; and, second, in support of somewhat higher rates, needed, it was declared by several witnesses, to protect the domestic chemical industry against the attacks of strong foreign cartels.

Among the arguments on the latter issue, one that was repeated emphatically by several witnesses, including Dr. Killheffer and Salmon W. Wilder, chairman of the executive committee of the Manufacturing Chemists' Association, was the need of increasing the rate of the basket clause, Paragraph 5 of the chemical schedule to 40%. This clause reads as follows:

> All chemical elements, all chemical salts and compounds, all medicinal preparations, and all the foregoing obtained naturally or artificially and not especially provided for, 25% ad valorem.

"Our reasons for that request," said Dr. Killheffer, "are stated at considerable length, because in an industry that is new, such as ours, there are new products from day to day that were unthought of before, and they quite naturally fall into that basket, and are often most inadequately protected."

One of the sharpest conflicts during the hearings on dyestuffs arose over the arguments for and against the American selling price as a basis of valuation in assessing tariff duties on products named in Paragraphs 27 and 28, covering coal-tar chemicals and finished dyes. Referring to these clauses Dr. Killheffer declared:

> Our industry is appreciative of what we consider to be a very good job which you did for us in the act of 1922. At that time it was realized that we came down here asking for something that we thought we needed, and you gentlemen gave us something that you thought would protect us, but after all we were both making the best estimate we could. . . . In the light of experience it is our belief that the rates you gave us originally in the bill as it was passed are by far the better rates for our industry, not simply because they were a little higher than the present ad valorem, but because they gave us the protection that we need in an industry like ours, where we must look very considerably to the future.

The allusion above was, of course, to the original ad valorem rate in Paragraph 27 of 55% and in Paragraph 28 of 60%, both of which were reduced to 40% and 45% respectively in September, 1924, as provided in the act of 1922. A return to the higher rates was asked and considerable testimony in support was submitted by the witness to show that the present rate is inadequate in protecting higher priced products Dr. Killheffer said further: "The greatest value in these paragraphs (27 and 28) is in the fact that American selling price is the basis of valuation." He clearly distinguished between this and the United States value to show how much preferable was the former in assessing competitive products.

Testifying later for the General Dyestuff Corporation, Dr. Eugene Pickrell submitted a number of arguments and specific evidence aimed almost entirely at the American selling price valuation. Contending that its outstanding effect has been essentially to oppose an embargo, he supplemented his argument with the statements made by Congressman James A. Frear in 1924, who introduced a bill for the repeal of this provision of the tariff.

The witness for the S. O. C. M. A., Dr. Killheffer also pointed out that domestic dye prices have declined every year since the passage of the 1922 tariff, despite the contentions made six years ago that protection would result in combinations and higher prices to consumers.

The great importance of the dyestuff industry was explained fully by Dr. Killheffer as well as its progress in scientific research and finally its economic problems resulting from pyramided labor costs in production and from foreign competition.

The lengthy brief submitted by the Synthetic Organic Chemical Manufacturers' Association requested higher rates on a number of other extremely important chemical products covered by other clauses of the chemical schedules, such as acetone and solvents.

The Mercerization of Rayon Pulp

Losses Through Mercerization—Duration of the Mercerization—Swelling of the Pulp

By PROF. A. LOTTERMOSER and HANS RADESTOCK
Dresden High School for Colloid Chemistry

Zeitschrift fur angewandte Chemie, December, 1927

A discussion of the effect of time, temperature, and concentration of caustic soda during the mercerization of wood pulp, with special reference to its use in rayon manufacture. The effect of the type of alkali is also considered. In each case the maximum swelling takes place at the same concentration of alkali as of the maximum alkali absorption.

OUR knowledge of the process of mercerization has been increased in many essential points by the work of Karrer, Vieweg (Zeitschr tangew. Chemie, 1924, p. 1008) and Dehnert (Dissertation, 1923, Dresden), since they all confirm by experiment the probability of a chemical reaction. The significance of this problem for the rayon industry caused us to develop still further previous experiments with cotton cellulose and to make a study of the behavior of pulp during the viscose process. For the most part the technique was the usual one.

The pulps were selected for the special characters which they possessed for experiment. In this choice especial attention was given to the process of cooking and bleaching and also to the degree of heating.

For all experiments air-dry pulp was used. The figures, therefore, are calculated in terms of bone-dry pulp. Drying was effected at 80° for 20 hours (in contrast to the method usually employed at a temperature of 100° to 105° for about 3 hours), since comparative investigations show that the slower method of drying gives far better results. A quick drying at a high temperature produces a viscous state of the outer layer of the felt; so that moisture is removed with difficulty from the inner canals and pores, a circumstance which, particularly in the case of a short pulp, causes a marked diminution of weight and may be the occasion of considerable error.

Losses Through Mercerization

The degree of solubility, a very important matter technically in the mercerizing process, was next determined by immersion for an hour in (NaOH) lyes of different concentration. The stock was beaten to a uniform length of the fibers and subjected to the action of a liquor of 1:10 strength. After maceration it was thoroughly washed until all alkali was removed, the pulp was dried and the loss of weight determined gravimetrically. The percentage of hemicellulose which goes over into the solution was estimated in terms of bone-dry pulp.

From the values obtained it was apparent that with increasing concentration of the liquor all samples of pulp reached a maximum solubility at about 3.2 mol., or 12.5% of NaOH, while beyond that point the solubility declined slowly but constantly until, in the case of saturated liquor, it corresponded to that of very dilute lye. This agreement with the swelling values (see below) shows the alkaline solubility of the pulp does not increase directly with the concentration of the base, but that it is a function of swelling, since the swelling maximum at about 3.2 mol. NaOH corresponds to the maximum solubility of the pulp. Or, expressed in terms of colloid chemistry, the quantity of hemicellulose which goes over into solution is determined by the surface area with which the swelling particles (cellulose) and the swelling medium are in contact.

Comparison of one pulp with another affords proof that the losses through mercerization are of various amounts, being principally dependent on the degree of bleaching and beating.

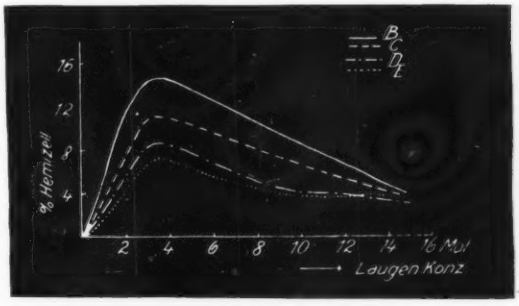


FIG. 1

In the group of both bleached and unbleached cellulose, the soda sulphate process of cooking caused a greater solubility than the sulphite process. Quite universally it was shown that a pulp is the more resistant to alkali and more carefully its chemical as well as its mechanical disintegration is carried out.

Duration of the Mercerization and the Solubility

If we follow the solubility of pulp in alkalies in its dependence on the duration of maceration, the influ-

ence of swelling is apparent here, too. The hemicellulose values increase for twelve to sixteen hours by 1% to 2% as compared with the initial value (after

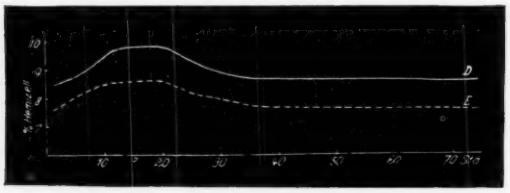


FIG. 2

one hour), remaining about eight hours constant at this point, and then diminishing after twenty to twenty-four hours by about the same amount.

If the temperature is raised, the mercerization losses increase at a constant rate. Nevertheless, even at 100, the losses do not materially exceed the double value of those at normal temperature. To cause an increase in the alkaline solubility, swelling in the colloid chemical sense does not enter into the calculation at all, since it diminishes with the rise intemperature, the important factors being an alkaline hydrolysis as well as an oxidation of intact cellulose. Again, the unbleached short pulp is attacked much less by the high temperature than bleached and slow pulp.

On the other hand, at normal temperature (20) the resistant or alpha-cellulose is neither attacked by the liquor nor carried over into solution, as may be shown by controlled experiments or repeated mercerization. The samples of pulp were treated three or four times

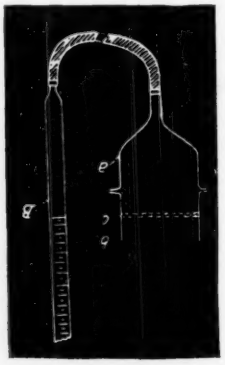


FIG. 3

with macerating liquor and between every treatment squeezed out thoroughly, washed and dried. Even with four mercerizations the loss of weight was 0.8% higher at the maximum point than after a single mercerization. From this it may be inferred with exactitude that the decrease is only due to unavoidable experimental losses; similarly with all possible care the oxidizing effect of the air cannot be entirely avoided. With unbleached short pulp, an increase in the portions soluble in alkali was hardly observed at all. Also the question concerning the quantitative relation between pulp and liquor and whether it exerts any of its influence on the solubility may be answered on experimental grounds in the negative. In so far as only sufficient liquor be employed as is required for mercerization (i. e., sufficient to obtain a momentary swelling maximum), this relation is without importance.

SWELLING OF THE PULP

The influence of the degree of swelling on the mercerization losses, being dependent on the concentration of the liquor and duration of maceration, caused us to make a more exact determination of the swelling of the cellulose in the lye, which resulted in some very important points of agreement with the adsorption of alkali. Since the primitive immersion method (immersion of the pulp in the liquor and determination of the increase of weight) yielded inexact results, an apparatus was constructed especially for this investigation. . . .

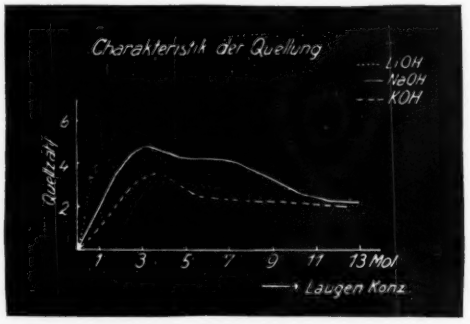


FIG. 4

In order to obtain a comparative value for the degree of swelling independent of the initial volume, the "swelling number" is given. It signifies the exact number of degrees by which the "swelling volume" exceeds the initial volume. In the case of three pulps of different degrees of beating the swelling for LiOH, NaOH and KOH was determined.

The swelling power of the hydroxides diminishes in the series from LiOH to NaOH to KOH. The variation in the swelling number according to the

(*Continued on page 74*)

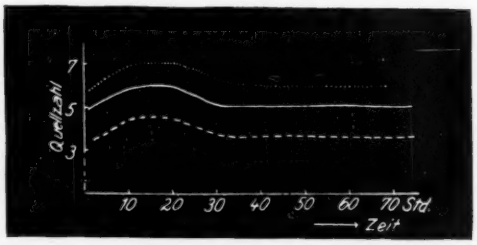


FIG. 5

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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EIGHTH ANNUAL MEETING
SATURDAY AFTERNOON SESSION

(Continued)

[*The report of the Saturday morning technical session and part of the afternoon session, with the papers delivered, and reports of the Open Forum and the annual dinner appeared in the two preceding issues.*]

President Killheffer—Are you ready, Professor Grimshaw?

We are going to skip a few papers in order to allow Prof. Grimshaw to get on his way to North Carolina. He has told me he is going to drive back. I think he would do better to fly, in this weather. (Laughter.) The subject of his paper is, "Some Dyeing and Dyers of the South." (Applause.)

Some Dyeing and Dyers in the South

By ALBERT H. GRIMSHAW
Associate Professor of Textile Chemistry and Dyeing, North Carolina State College, Raleigh, N. C.

A FEW weeks ago the Piedmont Section of this association had the pleasure of having Dr. Killheffer as its guest at the quarterly meeting. At that time Dr. Killheffer induced the dean of our textile school, Dr. Thomas Nelson, to have me prepare a paper to be read at this meeting. You all know the amount of work entailed in preparing a paper, and naturally I tried to get out of it by pleading lack of time. As Dr. Killheffer has proven himself to you a go-getter, he arranged to lengthen the time for this preparation, and so, with this apology, I will present a paper called, "Some Dyeing and Dyers in the South."

My reason for selecting this title was caused by the fact that during my vacations, which are usually enjoyed here in the North, I am often asked, "Do they dye anything of any account in the South?" I will try to show with samples, pictures and a few remarks that dyeing in the South is truly diversified.

As is evident to you all, it will not be possible to include everything relating to this subject in the short period used in reading this paper. Many friends have helped me to gather these samples and data to show here to-night, and many more would have aided if I had had time to call on them. So at this time I wish to express my thanks to those who helped and all who offered to help.

Naturally, as I was in a hurry to collect samples, a

great many of them have come from mills near us in North Carolina, but our other Southern States are also able to supply just as varied an assortment.

Many mills are making the same type of goods as shown in these samples, but, due to lack of time, I will not try to enumerate them all. On some of the samples you will note that the name of the mill is not given, because in some cases they were not willing that I should give you their names and addresses.

It will doubtless save time if we start with the samples, so let us first look over the samples of cotton dyeing. Here are a few of raw cotton dyed at the Pilot Mills, one of the three mills located in Raleigh, our home city. Direct and sulphur colors were used in the Chattanooga raw stock vacuum machine, and then the dyed cotton is spun into yarn and woven into cloth like these samples right here. Mr. Hughes is the dyer and Mr. Davis gave me the samples.

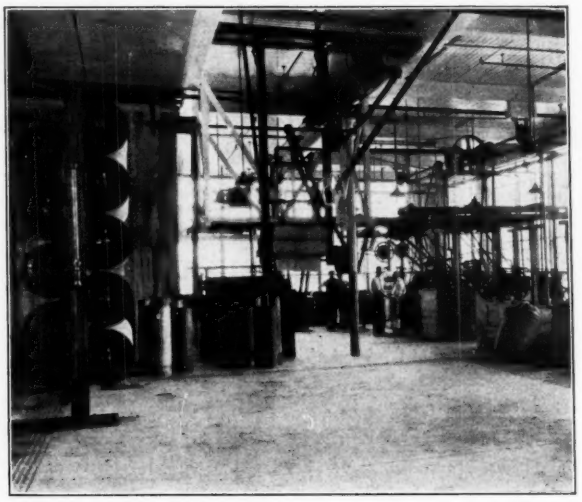
Plant of the May Hosiery Company, Burlington, N. C.

Here is some raw cotton from the Riverside and Dan River Cotton Mills, of Danville, Va., one of the largest mills in the South. This sample was dyed in the Brandwood machine, which dyes cotton from the lap. These other samples from the same mill were bleached and dyed in circulating machines. I am much indebted to H. M. Chase, whom many of you know, for these samples as well as others that I will show you later.

This knicker cloth was made from cotton dyed in the raw state, using Du Pont dyes. This sample of wristlet was dyed in the raw state, and then the dyed yarn was mixed with undyed to give this effect; it came from the Holt-Williamson Mill at Fayetteville, N. C.

Here are a couple of samples of wool which was dyed with Southern dyes and is used in making rugs and carpets. Sent in by Tom Marlowe and Claude Slayton.

Here is some skein-dyed yarn as dyed by the students at North Carolina State College Textile School; the yarn is afterward woven into cloth such as this sample here of the MacLean plaid, the plaid of our present Governor's clan. The dyes for this plaid were donated by Bob Glenn,

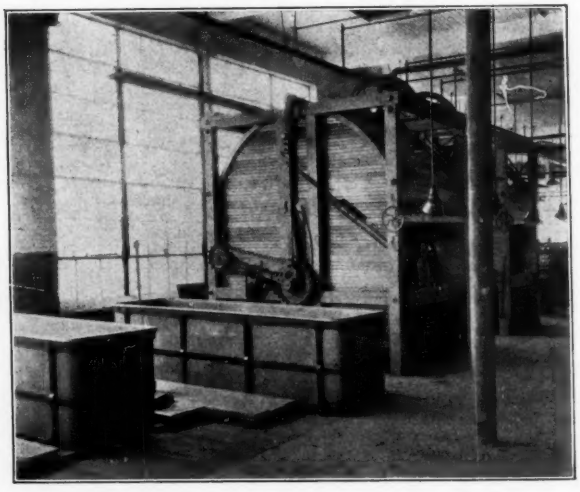


A Corner of the Carolina Dyeing & Winding Company, Showing Chain Dyeing and Dryer Cans

of the Ciba Company, and Mr. Hunt, of the Newport Chemical Works.

Here is some mercerized cotton dyed at the Cleveland Mill & Power Company, of Lawndale, N. C.; this was dyed on the Buhlmann machine for skein dyeing. These other skeins were dyed at the same mill and represent dyeing of twine, thread, etc. The samples were given to us by Mr. Forney. All samples are fast colors, vat and directs.

Two of our students were given an intensive course at the laboratory of the Ciba Company in Greensboro, N. C.,



Rotary Skein Dyeing Apparatus and Monel-metal Tubs at the Carolina Dyeing & Winding Company, Mount Holly, N. C.

Southern Dyeing Company, Burlington, N. C.

and then lectured to the classes, using the notes and samples which they collected there. Here is a sample of a vat-dyed yarn as dyed on the small continuous multi-compartment machine erected in their laboratory. Messrs. Glenn, Faust and Cosby, of Ciba, instructed the students during their sojourn there in Greensboro.

Mr. James and Mr. Carson, of the Carolina Dyeing & Winding Company, have furnished these samples of yarn dyed in skeins on the Klauder-Weldon machine: long chain dyed: and Gaston County Machine Company's beam and package dyeing machine.

This package, which has been cut open, shows the evenness obtained at Riverside and Dan River Mills in dyeing naphthol colors in the Thies package machine.

Here are some more samples of the Thies package dyeing dyed with Sandoz dyes at the Victor Monaghan plant at Greenville, S. C. These samples were furnished by Malcolm Mackenzie, whom so many of you knew when he was here in the North.

M. Johnson, superintendent of the Thies Dyeing & Process Company, Belmont, N. C., has sent along these paper tubes on which the package is sometimes dyed, the specially prepared paper tubes being able to withstand the action of heat and chemicals. On some of these other packages you will note that perforated metal tubes are being used. Here are samples from this firm of vats, direct, developed and sulphurs.

Paul Haddock, of the Klipstein Company, has given me these samples of package-dyed cotton dyed on the package machine made by the Gaston County Machine Company. One is bleached and the others are Klipstein colors, including a developed, a sulphur and a vat. The dyeing was done by the Lola Manufacturing Company, of Stanley, N. C., and the superintendent, F. H. McCoy, has also furnished me with one of the tubes as used in the machine. Note that it is perforated and when used is covered with knit goods.

This yarn was dyed in the Morton machine at Columbus, Ga., and was sent in by E. A. Feimster.

Here is some yarn dyed on the Franklin process machine by D. Gryder, of the Southern Dyeing Company, Burlington, N. C.

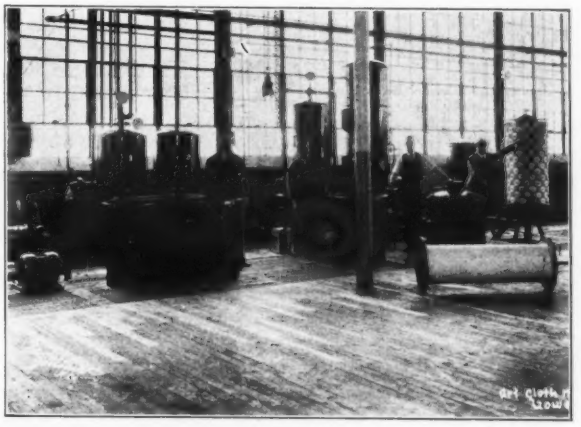
Of course, other mills are using these machines for package dyeing, and here are a few samples of beam dyeing. This yarn was dyed in the Brandwood beam dyeing machine at the Riverside Mills.

These samples of cloth in these books, loaned to me by L. Gregg, show cloth that was dyed in the raw stock or in package machines, including samples from the Thies, Franklin, Hornbuckle or Gaston County, Brandwood and Morton.

While speaking about raw-stock dyeing, I must not forget this bedsheet which was dyed with vat dyes in the raw stock by R. B. Cooke, of the Fort Mill Manufacturing Company, South Carolina, then woven into sheets and bedspreads. Dyed in Chattanooga circulating machines; bleached in the piece.

Here is some Indigo-dyed yarn, one sample from the Pilot Mills in Raleigh, N. C., the other from the Riverside in Virginia. I might mention that several of Mr. Chase's original ideas are incorporated in the machines at Riverside.

Of cotton piece goods dyeing I have here a few samples; the first are on cloth which was dyed in the piece in a six-compartment continuous machine using vat colors. I am not permitted to give the name of the mill. The same firm also furnished this sample of Sulphur Black



Package Dyeing at the Art Cloth Mill, Lowell, N. C.

and also Naphthanil dyeing in the piece. These were all dyed with Du Pont dyes.

Here are a couple of samples from the Victory Mill, of Fayetteville, N. C., given me by D. Purcell. They were padded and then developed in the jig.

H. A. Barnes, of the Proximity Manufacturing Company, Greensboro, N. C., has loaned me these fine samples of piece-dyed sulphur colors. Here are some nice suitings made by using a resist printing and over-dyeing with Aniline Black. Look at these five, six and seven color prints, and this discharged Indigo print! The South is coming along in the printing line and we are truly proud of their work.

Here is a peculiar type of dyeing. This cloth is used in making wristlets for cheap work gloves; it is scoured and dyed in rope form in a Rodney Hunt machine by the Holt-Williamson Company at Fayetteville, N. C.

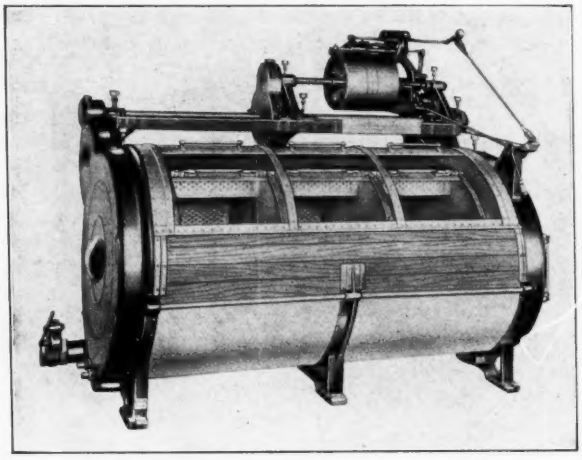
Here are some results of experimental printing as done by our students. Note these in which Kieropon was used, the chemical spoken of last evening by A. R. Thompson.

Here are some cotton towels containing vat-dyed stripes, made by the Cannon Manufacturing Company, the largest mills in the world making towels. Sent to us by G. G. Allan.

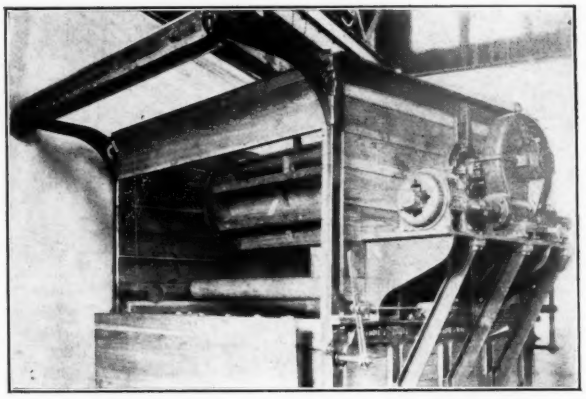
Last but not least in cotton dyeing are these children's socks dyed in Griffin, Ga., by the Spaulding Knitting Mills and given to me by R. Shapard.

My time is so limited that, after showing these books which were loaned to me by Mr. Gregg, I will pass over to rayon dyeing. These books contain cloth which has been dyed in raw stock, skein, package or piece, and many kinds of dyeing and machines are represented. The time is too short to go into details

This skein of random-dyed Viscose comes from the



Rotary Dyeing Machine, Three Open Pocket Type, Regular Finished Cylinder



Worm Driven Dye Kettle at Holt-Williamson Company for Scouring and Dyeing Knit Wristlets in Rope Form

Carolina Dyeing & Winding Company, of Mount Holly, N. C. They also furnished the rayon which was dyed on a Klauder-Weldon rotary skein-dyeing machine. These samples of Du Pont were dyed on the Smith-Drum machine for skeins and were furnished by Mr. Gregg, of the Du Pont Company, but were dyed at the Hartsell Mills, of Concord, N. C.

Here is some tub-dyed, skein-dyed rayon as done by the students.

Mr. Rose, of the Viscose Company, has sent me these samples of Viscose dyed by the Southern Franklin Process Company.

The Industrial Dyeing Corporation sent me these nice Viscose skeins from the Charlotte plant and also the information that they were probably the largest plant in the country dyeing rayon exclusively. The dyeing is in charge of Karl Ginter, who received his training in Europe.

Here is some plush containing rayon sent to me by Thomas Nuckolls, Secretary of the Piedmont Section. Mr. Nuckolls also sent along these other plush samples which contain cotton. The dyeing is done at his plant, the Piedmont Plush Company, of Greenville, S. C.

This bedspread containing dyed rayon was loaned by Mr. Wall, of the Carolina Cotton & Woolen Mills, of Leaksville, N. C.

Here are some scarfs loaned to me by Mr. Gregg; note the dyeing of these, all Du Pont colors.

Here are some samples of Bemberg rayon which are the only samples shown this evening which are not dyed in the South; however, the yarn was made in Elizabethton, Tenn. And you all realize that many rayon plants are going up in the South. In North Carolina alone we have two now in the process of building.

This sample here contains Celanese, which was chopped up and mixed with raw cotton and spun along with it.

When dyed with direct dyes, the cotton became colored, as you see, and the Celanese remained white. This work was done at the Holt-Williamson Company.

Here is a group of samples containing Celanese which were supplied by Todd Meisenheimer, the Southern representative of the company. Note the various effects obtained in cross-dyeing.

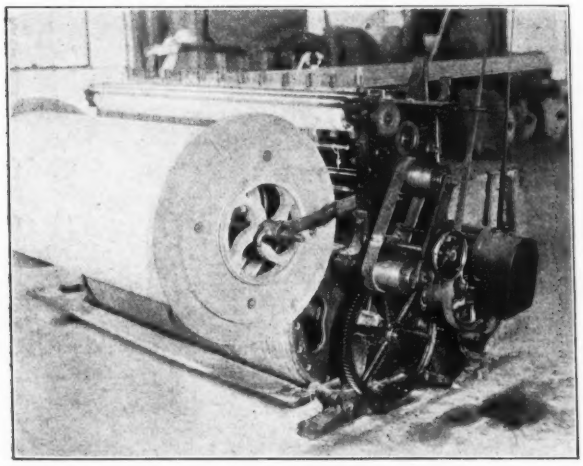
Here are some three-fiber hose dyed by Mr. Pritchard, of the O'Brien Hosiery Company, Winston-Salem. This firm uses Butterworth machines to a great extent.

Here are some two-fiber children's socks containing cotton and rayon from the Spauling Hosiery Mill of Georgia.

Here are some four-fiber socks dyed by Mr. Pritchard; cotton, rayon, silk and Celanese. I believe that the rayon was Tubize.

Some more of Mr. Meisenheimer's dyeing—four fibers

This all-silk sample was dyed by Mr. Michaels, of the Melrose Mills, High Point, N. C.



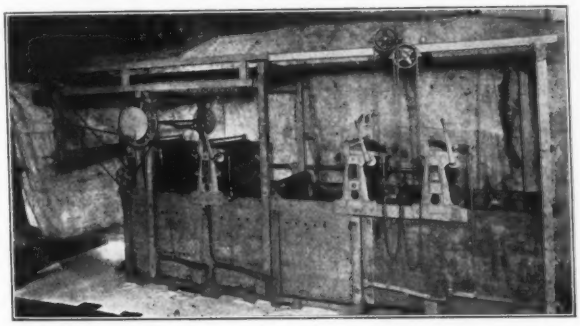
Winding a Perforated Beam for the Dyeing Machine, Lola Manufacturing Company, Stanley, N. C.

This four-fiber sock, dyed by Mr. Meisenheimer, contains wool.

Here is a rug containing wool that was dyed at the Carolina Cotton & Woolen Mills at Leaksville, N. C. They did not care to tell in what machines or give any data, but Mr. Slayton tells me that in some of the mills in which he sells Sonneborn dyes for this type of work the mills are using acid dyes on their raw wool. They are also doing some of the dyeing, using Hussong machines.

These two blankets contain wool and were dyed by the Carolina Cotton & Woolen Mills at their plant at Spray, N. C.

These samples must have shown you some of the diversification of dyeing in the South, and now we wish to show you a few pictures of the South which will speak for themselves.

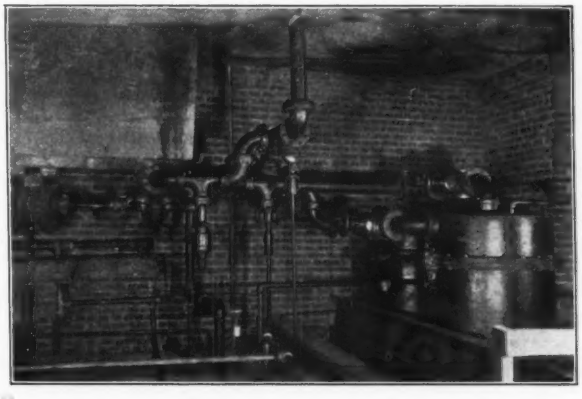


A Sulphur Black Dyeing Machine at the Pilot Mills, Raleigh, N. C.

While I am arranging for the pictures you might wish to know some of the men who are selling dyes in the South. I will mention a few that come to mind, but will not intentionally miss anyone. See if some of the following are not familiar to you all. I will try to give them to you alphabetically, hoping to escape all blame for favoritism. Most of these men call on us at the school:

Ciba Company—Bob Glenn, John Cosby and Mr. Faust; Du Pont—John Dabbs, Messrs. Howard, Constable, Gregg and Sandredge; General—Randolph; Klipstein—Paul Haddock; National—Mr. Willard, K. Mackenzie, Brown, Dulin and Shuford; Newport—Mr. Hunt, Horne; Sandoz—M. Mackenzie; Sonneborn—Tom Marlowe and C. Slayton; Charles Stone—by Charles Stone. I do not intend to slight others, but these are the ones coming to my mind.

Doubtless many of you have never been South and so have not had an opportunity to see cotton growing, picked



Showing Under-floor Arrangement of Two-unit Dyeing Machine at Lola Manufacturing Company

or ginned. I have tried to collect a few pictures of such processes, which I hope will be of interest to you all.

[*Professor Grimshaw at this point exhibited on the screen a number of extremely interesting photographs of cotton ginning, picking, loading, etc., of Southern mill employees and of various Southern mills, showing detailed pictures of dyehouse interiors, installations of all types of processing machinery and laboratories. A few of these illustrate the foregoing paper.*]

President Killheffer—While we are in shape for the use of the lantern, we will proceed to Dr. Scott's paper on, "Color Science Applied to Textiles." (Applause.)

Dr. W. M. Scott—This paper is entitled, "Color Science Applied to Textiles." It follows a previous paper on the same subject or a similar subject presented before the Dye Division of the American Chemical Society.

COLOR SCIENCE APPLIED TO TEXTILES

By Walter M. Scott, Ph.D.

Service Director, Munsell Color Company, Inc.

In a previous paper presented before the Dye Division of the American Chemical Society* an attempt was made to distinguish between three general methods for specifying colors. The names which were adopted to characterize these three methods of color specification were (1) physical, (2) physiological, and (3) psychological.

To summarize briefly: physical specifications deal with the stimuli which are transmitted from any colored material to the eye; physiological specifications deal with the excitations in the eye which result from such color stimuli, and psychological specifications deal with the visual sensations produced by such color excitations.

*American Dyestuff Reporter, December 10, 1928.

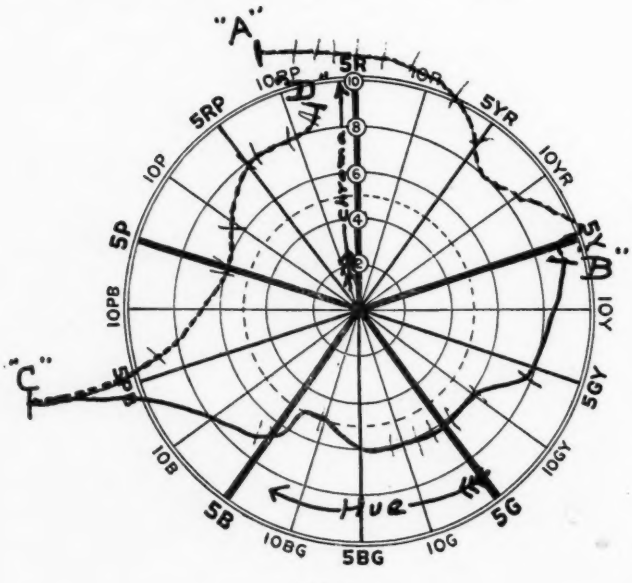


Fig. 1

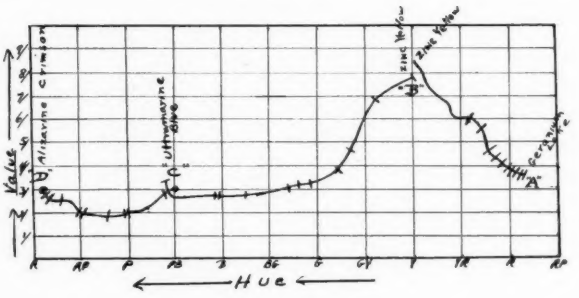


Fig. 2

The earliest form of physical specifications of colors were on the basis of pigment mixtures. However, research workers gradually became aware of the fact that uniform mixtures of pigments and dyestuffs did not necessarily produce an even progression of colors to the eye. Figs. 1 and 2 illustrate this fact very clearly. In Fig. 1 the changes in hue and chroma with varying proportions of pigments in mixture are plotted, and in Fig. 2 the changes in hue and value are similarly shown.

Four pigments were used in this particular study as follows:

"A" Geranium Lake.
"B" Zinc Yellow.
"C" Ultramarine Blue.
"D" Alizarine Crimson.

If pigment mixtures formed an even progression of color steps to the eye they would appear as straight lines on these graphs. In reality it will be seen that the lines are anything but straight. For example, "A" represents the color produced by 100% Geranium Lake, and "B" represents the color produced by 100% Zinc Yellow. The divisions on the line from "A" to "B" show the colors of mixtures of 90% "A" with 10% "B," 80% "A" with 20% "B," 70% "A" with 30% "B," etc. Thus an addition of 10% of Geranium Lake has a marked influence on the color of pure Zinc Yellow, but an addition of 10% of Zinc Yellow has only a little influence on the color of pure Geranium Lake.

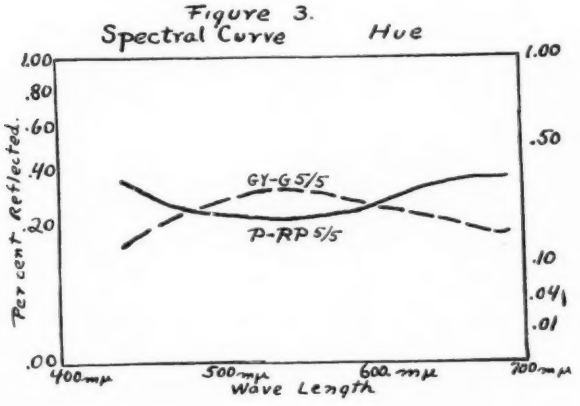
Other preliminary studies indicate that mixtures of dyestuffs exhibit similar peculiarities. It is proposed to undertake further research along this line and this work will be reported in subsequent papers from time to time.

The Spectrum and Color Research

Although the earlier colorists found it increasingly difficult to explain the vagaries of pigment mixtures they were at a loss for any other basis to work from until Sir Isaac Newton discovered the spectrum. This discovery gave a new impetus to research in color and eventually led to the development of a fundamental physical specification for any color, i. e., the spectral reflection (or transmission) curve.

Just as the spectral curves accurately describe the color stimuli which are transmitted to the eye, so the standard scales of hue, value, and chroma provide an accurate measure of the three qualities of color which the eye visualizes. It is most important, therefore, to clearly understand the connection between these two methods of color specification.

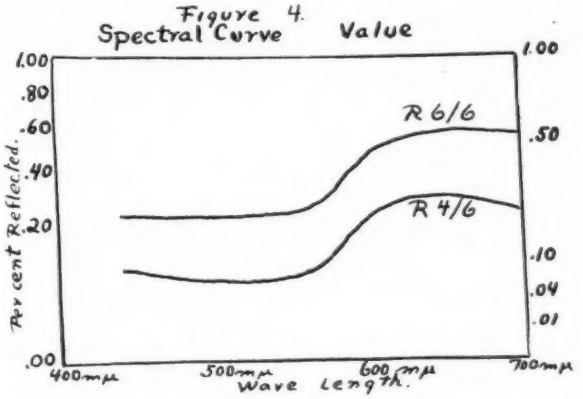
Fig. 3 illustrates the spectral reflection curves of



two colors which differ in hue but are alike in value and chroma. One color is three-quarters of the distance from yellow toward green in hue and has a value of 5 and a chroma of 5. The other color has the same value and chroma but is exactly complementary in hue, being three-quarters of the distance from red toward purple. The Munsell notations for these two complementary colors are GY-G 5/5 and P-RP 5/5 respectively.

Fig. 4 illustrates the spectral reflection curves of two colors which differ in value but are alike in hue and chroma. Both colors are of the same red hue and have a chroma of six but the color represented by the upper curve has a value of 6 and the color represented by the lower curve has a value of 4. The Munsell notations for these two colors are R 6/6 and R 4/6 respectively.

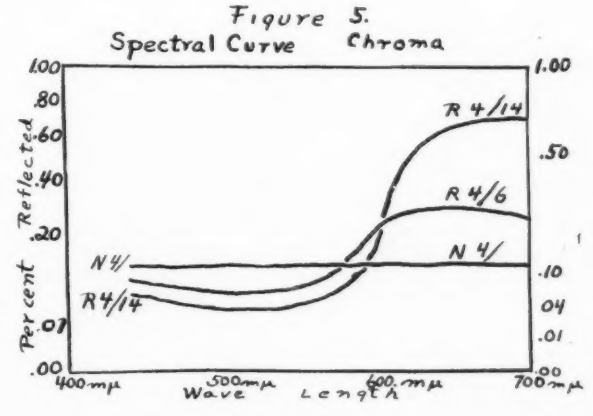
Fig. 5 illustrates the spectral reflection curves of two colors which differ in chroma but are alike in hue and value. Both colors are of the same red hue and have a value of 4, but one color has a chroma of 14 and the other color has a chroma of 6. For comparison, a third curve is included in this figure to



represent a neutral gray of the same value, which has no hue or chroma. The Munsell notations for these three colors are R 4/4, R 4/6 and N 4/ respectively. It will be seen that the curve becomes steeper as the chroma increases, while as the chroma decreases the cure approaches a straight line.

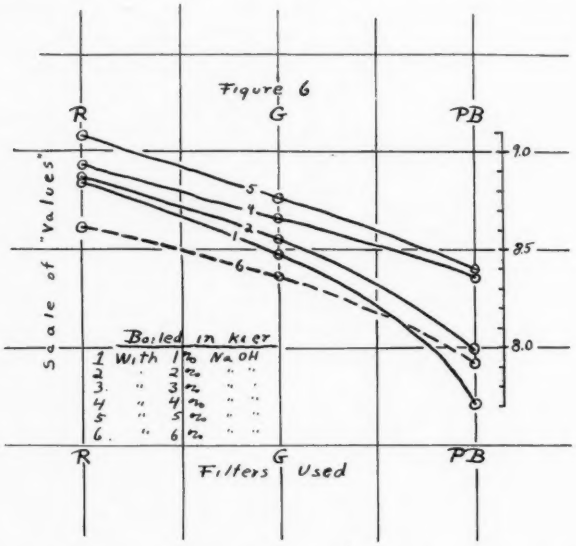
In actual practice it is not always necessary to draw complete spectral curves in order to acquire the necessary information about a series of similar colors. Mr. Appel in a paper presented before last year's annual meeting of our Association* demonstrated that seven reflection measurements were in most cases sufficient to provide a satisfactory color specification. In some instances, five or three reflection measurements are sufficient, while in special cases even one reflection measurement will tell the story. The following illus-

*Proceedings A. A. T. C. C., 1928, p. 29.



tration shows the application of these principles to a practical textile problem.

To illustrate the effect of different concentrations of caustic in the kier boiling of cotton piece goods six samples were prepared. Each of these samples received exactly the same treatment, but with concentrations of 1%, 2%, 3%, 4%, 5% and 6% NaOH



respectively. The reflection power of these samples was measured in a special photometer through a red filter, a green filter, and a purple-blue filter, having dominant wave lengths of 641, 542 and 445 millimicrons respectively. For comparison purposes integral reflection measurements were also made in daylight illumination and in artificial light illumination.

It was subsequently found that the sample which was treated with 3% NaOH was quite uneven in color so that the measurements made on this sample had to be discarded. The reflection factors were translated into Munsell "values"* and the results are listed in Table I.

*Munsell "values" denote lightness or darkness as seen by the eye.

TABLE I

Sample No.	Strength of Caustic	Relative Values: Red Filter	Green Filter	Purple-Blue Filter	Daylight	Artific'l Light
1	1% NaOH	8.84	8.48	7.71	8.36	8.45
2	2% NaOH	8.87	8.55	7.99	8.55	8.64
4	4% NaOH	8.93	8.66	8.36	8.56	8.83
5	5% NaOH	9.08	8.76	8.40	8.90	9.01
6	6% NaOH	8.61	8.36	7.92	8.58	8.31

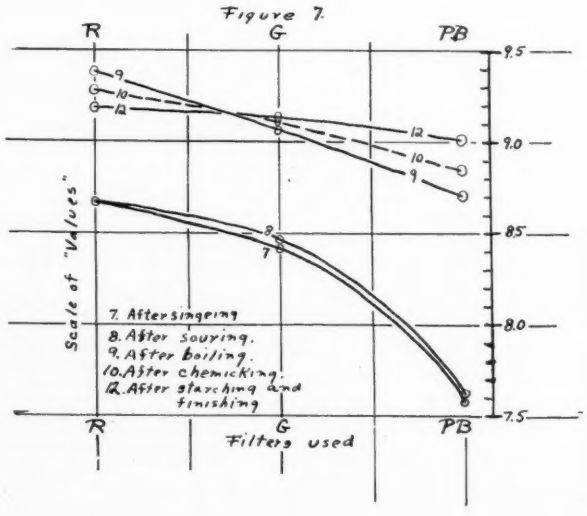
A better conception of the comparison between the different samples may be obtained from Fig. 6. Here are plotted the "values" obtained through the red, green and purple-blue filters. The slopes of all the curves are very nearly the same, indicating that there is little change in hue and chroma, but that from 1% to 5% NaOH there is a progressive brightening of the samples. With 6% NaOH the color of the sample darkens again so that it is quite similar to the 1% sample.

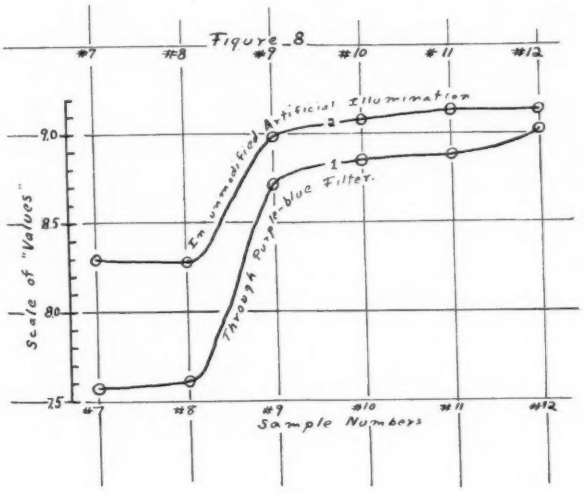
Another series of six samples were prepared to show the changes in color of cotton piece goods during its passage through the bleach house. Again, difficulty was experienced with one of these samples, but five of them gave very concordant results, which are listed in Table II.

TABLE II

Sample No.	Sample Taken	Relative Values: Red Filter	Green Filter	Purple-Blue Filter	Daylight	Artific'l Light
7	After singeing	8.67	8.42	7.58	8.36	8.30
8	After souring	8.67	8.47	7.61	8.21	8.28
9	After boiling	9.38	9.07	8.71	9.07	8.99
10	After chemicking	9.28	9.11	8.85	8.99	9.08
12	After bleaching, starching and finishing....	9.19	9.13	9.02	9.13	9.13

These results are plotted in Fig. 7. Here it is seen that samples 7 and 8 are practically identical in color. Between sample 8 and sample 9 there is not so much difference in hue and chroma but there is a marked lightening in value. Samples 9, 10 and 12 have very





nearly the same value but there is a gradual weakening in chroma, i. e., they are approaching toward a neutral white.

A further analysis of the results obtained on the two series of samples shows that the reflection measurements obtained through the purple-blue filter are the most significant for these particular colors. Figs. 8 and 9 show the purple-blue readings plotted for each series. For purposes of comparison the measurements under artificial illumination are also plotted.

In Fig. 8 the gradual improvement from sample 1 to sample 5 and the subsequent drop to sample 6 is clearly shown. In Fig. 9 the close relationship between samples 7 and 8, the long jump to sample 9, and the gradual rise to sample 12 is also clearly shown. In both figures the purple-bue measurements give a smoother curve and bring out more clearly the actual changes in the samples.

The preceding illustrations show the application of the *physical* specification of color in the form of spectral reflection measurements to one branch of the textile industry. An illustration will not be given to show the application of the *psychological* specification of color to another textile field.

Two patches of silk were dyed according to the following formulas:

Sample 5—0.5% Azo Yellow
Sample 6—0.5% Azo Yellow
—0.01% Orange II

The hue, value and chroma of each sample was carefully determined both under daylight and artificial (Mazda) light. The results are given in Table III.

TABLE III

Sample No.	—Under Daylight— Hue	Value	Chroma	Under Artificial Light Hue	Value	Chroma
5.....	7Y	8.2	9	5Y	8.2	9
6.....	5Y	8.2	9	4Y	8.0	9

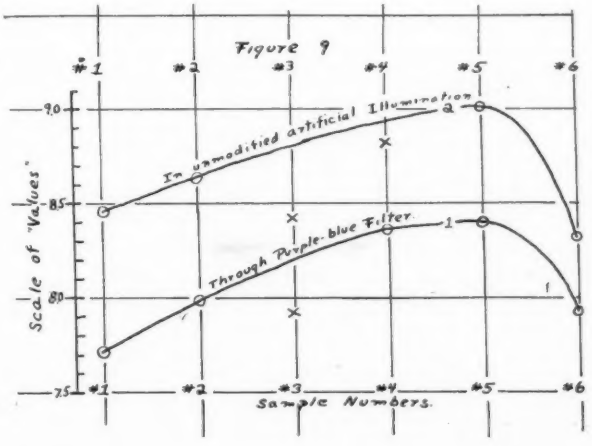
It will be seen that the value and chroma differences in these four measurements are negligible, so that the changes in hue are the significant factors. The addition of 0.01% of Orange II to the 0.5% of Azo Yellow causes a reddening of the hue equivalent to two hue steps, i. e., from 7Y to 5Y. Curiously enough, practically the same reddening occurs when the sample dyed with 0.5% of Azo Yellow is viewed under artificial light. This is a striking example of the effect which the quality of the illumination has upon colors as they appear to the eye. It shows the importance of doing all color matching under a standard illumination.

A final illustration is given to bring out more forcibly the contrast between illumination by daylight and by artificial light. Two patches of silk were carefully dyed to match under daylight. The following dyestuffs were used:

SAMPLE R	SAMPLE G
Fast Light Yellow G	Fast Light Yellow G
Orange II	Orange II
Azo Fuchsine 6B	Azo Fuchsine 6B
Fast Acid Violet 10B	Alphazurine 2G

Table IV gives the spectral reflection measurements of these samples and Table V shows the hue, value, and chroma of each sample under daylight and artificial light.

An examination of Fig. 10 will show that the *physical* spectral reflection curves of these two samples are somewhat different, but it is extremely difficult to de-



duce from these curves just what differences would be apparent to the eye. On the other hand, the measurements of the *psychological* qualities of the two colors show that they are practically identical under daylight illumination. Both samples show changes in hue under artificial light, but with sample R the change is much larger than with sample G. Consequently, under artificial light, sample R is two steps redder in hue than sample G. The hue, value, and chroma measurements in this instance bring out more clearly the difference between the two samples than the spectral reflection curves.

TABLE IV

Wave Length	——Absolute Reflections—— Sample R	Sample G
440	0.0900	0.0920
460	0.0924	0.0934
480	0.0965	0.0975
500	0.103	0.106
520	0.121	0.121
540	0.143	0.142
560	0.167	0.166
580	0.194	0.199
600	0.232	0.257
620	0.290	0.325
640	0.384	0.282
660	0.530	0.348
680	0.629	0.514
700	0.700	0.601

TABLE V

Sample	——Under Daylight—— Hue	Value	Chroma	Under Artficial Light Hue	Value	Chroma
R	5YR	5.2	6	2YR	4.7	6
G	5YR	5.2	6	4YR	4.6	5.8

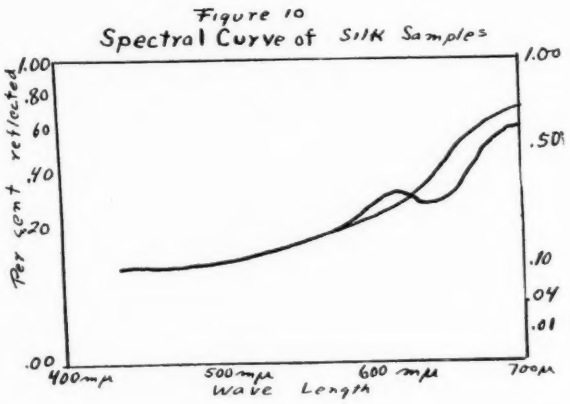
SUMMARY

1. This paper has graphically emphasized the vagaries of pigment mixtures and has pointed the way toward a similar study of mixtures of dyestuffs on textiles.

2. It has brought out the correlation between the physical specification of color in the form of spectral reflection measurements and the psychological specification of color in the form of hue, value and chroma measurements.

3. It has illustrated the use of reflection measurements to control the kier boiling and bleaching of cotton piece goods.

4. It has illustrated the use of hue, value and chroma measurements as a basis for standard color specifications of dyed silks.



President Killheffer—We will now have a paper on "The Effect of pH in Scouring and Dyeing Rayon Upon the Resulting Shades," by Prof. Charles E. Mullins, of Clemson College. (Applause.)

Prof. Charles E. Mullins—Mr. President and Gentlemen: At the start I should like to say there is an error in the title of my paper as it appears on the program. The title is, "The Effect of pH in Scouring, and Dyeing Rayon with Direct Colors (not Vats) Upon the Shade Obtained on Viscose Rayon with Dyestuffs."

The Effect of pH in Scouring and Dyeing Upon Resulting Shades on Viscose

By CHAS. E. MULLIN, M.Sc., F.A.I.C., F.C.S., F.T.I.
Professor of Textile Chemistry and Dyeing, Textile School of Clemson College

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A GREAT deal has been written regarding the uneven dyeing properties of rayon and I have been interested in learning whether there is any connection between pH at which the rayon is scoured and its affinity for dyestuffs, as well as just how the pH of the dye bath affects the shade of the dyed rayon. The following is a brief presentation of the results of a number of preliminary experiments along this line now under way in the Textile Chemistry and Dyeing Department of Clemson College. In these experiments a number of skeins were first treated in a bath of definite pH and at a given temperature for an hour. These skeins, in combination with other skeins treated at a different pH were then dyed in a bath of definite pH, and the shades obtained upon each skein compared.

Effect of pH Before Dyeing

In the experiments upon the effect of alkaline treatments upon viscose silk before dyeing, two sets of experiments were made, one at 20° C. (68° F.) and the other at 85° C. (185° F.), in order to study the effect of temperature in connection with pH. In each set of experiments the skeins were treated at five different hydrogen ion concentrations, i. e., 8, 9, 10.1, 11 and 13.2, for one hour, using a 20 to 1 bath. At the end of the hour the skeins were rinsed free of alkali in cold water and then dried at atmospheric temperature.

The solutions of pH 8 and 9 were prepared with borax, and the solutions of pH 10.1, 11 and 13.2 with sodium hydroxide, using the colorimetric method. Upon potentiometrically checking the pH of the solutions after treating the rayon, it was found that practically no change in pH had occurred.

After the pretreatments, the skeins from each lot were separated and one skein from each hot and each cold treatment, at each pH, were grouped, along with an untreated skein of viscose, for dyeing. Each of these sets of skeins was dyed at 85° C. (185° F.) in a 30 to 1 dye bath of definite pH for one-half hour with 0.25% of dyestuff, on the weight of the yarn, without salt, soap, or any other addition except the borax or caustic soda necessary to give the desired pH. After dyeing the skeins were quickly rinsed in a dilute soap solution and then thoroughly in warm water, squeezed and dried at room temperature.

Duplicate sets of dyeings were made, using two different dyestuffs: one set with 0.25% of Direct Blue 2B (Newport), Colour Index No. 406, a very rapidly exhausting dyestuff; and the other set with Direct Fast Scarlet 8BA (Newport), Colour Index No. 326, which exhausts slowly. While the results are not striking, they are at least interesting.

Results of Dyeing Experiments

As a result of the dyeings with Direct Blue 2B, the skeins dyed pH 12 and 85° C. are the darkest, and of these the skein previously treated at pH 13.2 and 20° C. is the darkest, with the skeins treated at pH 11, 10.1, 9 and 8 at 20° C. following in about the order named. The untreated skein is next darkest, followed by the skeins treated at 85° C. However, the difference between individual skeins is so slight that it is almost impossible to grade them accurately according to shade.

The skeins dyed at pH 11 appear to be next darkest in shade and, of these, those treated at 20° C., as well as the untreated skein, appear to be slightly darker than those treated at 85° C. However, the difference between individual skeins treated at either 20° or 85° C. is not great.

The skeins dyed at pH 9 are next deepest in shade and again those treated at 20° C. are darker in shade than those treated at 85° C., with the untreated skein between the two series.

This set is followed by the skeins dyed at pH 13.2, of which the untreated skein is considerably darker than those treated at 20° C., and these in turn are slightly darker than those treated at 85° C.

The palest shades were obtained by dyeing at pH 7, and of these probably the darkest skein is that previously treated at pH 13.2 and 85° C. All of the skeins treated at 85° C. appear to be darker than those treated at 20° C., especially at the same pH, and those treated at 20° C. are all darker than the untreated skein.

Dyeings with Direct Fast Scarlet 8BA

Of the dyeings with Direct Fast Scarlet 8BA, the darkest shades were obtained in the dye bath of pH 11, and of these the skeins treated at 20° C. appear to be slightly darker than those treated at 85° C. The untreated skein matches those treated at 20° C. very closely.

The next deepest shades were obtained on the skeins dyed at pH 12, and again those treated at 20° C. are slightly darker than those treated at 85° C.

The skeins dyed at pH 9 are somewhat lighter in shade than those dyed at pH 12, and those treated at 20° C. are very slightly darker than those treated at 85° C. The untreated skein appears to be between the two sets.

The skeins dyed at pH 13.2 are considerably lighter than those dyed at pH 9 or above, and in this case again, those treated at 20° C., and the untreated skein, appear slightly darker in shade than those treated at 85° C.

Just as in the case with the blue dyestuff, the palest shades were obtained by dyeing at pH 7 but only very slight differences in shade are apparent between any of the individual skeins dyed at pH 7. However, the skeins dyed with Direct Fast Scarlet 8BA at pH 7 appear to have taken up considerably more dyestuff than those dyed with Direct Blue 2B.

Dyeings on Untreated Viscose

In order to further study the effect of pH and temperature upon viscose silk in dyeing, skeins of unscoured and untreated viscose silk were dyed at 20° C.

and 85° C. in baths of various hydrogen ion concentrations.

When dyed at 20° C. in a 30 to 1 dye bath with 0.25% of Direct Blue 2B for one-half hour, without salt or other addition except the alkali necessary to give the desired pH, it was found that the depth of shade gradually increases with increasing pH, even beyond pH 13.1. Shades dyed in a 2% solution of sodium hydroxide, on the volume of bath and not on the weight of yarn, are darker than those obtained at pH 13.1, and those dyed in a 3% solution of sodium hydroxide are even darker than those dyed in the 2% caustic solution. The greatest differences in shade appear to be between those of pH 10 and below, and those of pH 11 and above. In each of these groups there is a gradual increase of shade with increasing pH, with the greatest difference in shade between the skeins dyed at pH 10 and pH 11.

On the other hand, when this experiment was repeated at 85° C., instead of at 20° C., by far the darkest shade was obtained at pH 11, followed by that dyed at pH 12. The shades obtained at pH 8, 9 and 10 were much lighter than that at pH 12, but do not differ much between themselves. In the same way, the skeins dyed at pH 13.1, in a 2% solution of sodium hydroxide, and in a 3% solution of hydroxide, the last two by volume of solution, not on weight of skein, are considerably lighter than those dyed at alkalinities less than pH 10, but decrease in the order named above. The skein dyed at pH 7 is probably the palest shade of the lot.

While the above results are not sufficient upon which to base any sweeping conclusions, they are sufficient to show the importance of pH and temperature in duplicating shades upon various lots of rayon. While the pH of the scouring bath does not appear to be as important as might have been expected, both the pH and temperature of any wet pretreatment of the rayon before dyeing does appear to influence the shade obtained by a uniform dyeing process to at least some extent. The importance of this pretreatment, as regards to shade, varies somewhat with the pH at which the rayon is dyed, as well as that at which it was treated.

It is also shown that the pH at which the deepest shade is obtained from a given dyestuff varies with the temperature of the dye bath.

I might add that the above results agree very well with some preliminary experiments upon cotton. Further experiments are in progress upon cotton, other regenerated rayons, and acetate silks. These results will probably appear in one of the journals during the coming summer.

President Killheffer—Gentlemen, I want to thank you very much for your attention. Some of you have stuck right through nobly, and I hope that you have been amply repaid by the papers that have been presented.

I want to thank the speakers, and crave their pardon, as well as yours, for holding them very sharply to our time limitation this afternoon. I think you appreciate that without doing that we would never have finished at this hour, which is the hour that we must leave this room, if we want anything to eat tonight. Eating always having been one of my favorite sports, you can understand why I hurried the thing along.

The meeting stands adjourned until 6 o'clock.

. . . The meeting adjourned at 5 o'clock.

[*This concludes the report of the Eighth Annual Meeting.*]

FALL MEETING OF THE SOUTH-CENTRAL SECTION

THE fall meeting of the Section was held at Patten Hotel, October 20, 1928, with a very good attendance. The meeting was planned somewhat differently from the regular meeting, and was in the form of a smoker, with no special papers or speakers.

Noel D. White started a discussion on hosiery dyeing. After the matter had been pretty well covered, other interesting subjects were brought up for general discussion. Mr. White's remarks are published herewith.

As a whole the meeting was very entertaining and interesting.

Mr. White made a motion, duly seconded and carried, that the Secretary be instructed to write the Council that the South-Central Section heartily approved the efforts of our President for founding a Technical Research Bureau, and will support him and the Association the best way we can.

J. BAYNARD SMITH, *Secretary.*

Hosiery Dyeing

Opening a Discussion

By NOEL D. WHITE

AS I promised Mr. O'Neil to start a discussion on dyeing, I have chosen as the subject the dyeing of hosiery, naturally, because I am at present engaged in it and, according to what I hear from my brethren, I am doing it in an outlandish way, a way which I am assured, even by my best friends, is not the best way to dye hosiery. Now that I am given the opportunity I am going to defend my method and also find out

from you, if possible, the reason why my method has been discarded, for I am sure when silk hosiery dyeing was a new thing it was dyed the same way I am doing it now.

Silk hosiery, so far as I know, is dyed at the present time in three distinct ways. Some dyers dye in one operation. They boil off and dye in the same bath. Some dyers dye in a second bath. After boiling off and washing the goods they put on the dyes in a clean bath with or without Glauber salt. Others also dye in a second bath with Glauber salt, but use some formic or acetic acid. That is the way we do it, but it seems that we are the only ones that are still doing it that way.

In one thing we all agree, however, and that is the boiling off of the goods, except that some boil off in olive-oil soap, others use some kind of boil-off oil, still others, I am told, boil off in half-heated baths with caustic soda and protectol.

Those that do the dyeing in the boil-off bath are doing successful work, no doubt, otherwise they would have changed after a while and learned some other way. I would like to know how many are here to-night who dye that way?

Those who use two baths also must be doing well, because otherwise they could not hold their job. How many here dye in two baths?

Now, are there any here to-night dyeing with acetic or formic acid in the dyeing bath?

Being in the minority, does that mean that we are wrong or out of step with the times? Some time ago a man came to Chattanooga from a mill in North Carolina. He is a pioneer in full-fashioned hosiery and had come to show us how to put up and start our first full-fashioned machines. When he came around to see the dyehouse, he said to me that I would do a lot better to dye in the boiling-off bath. You will have better dyeing and better finishing, he said. I told him I would like to see some of his work so I could judge by myself if his work was better than mine. He promised to send me some stockings. I am still waiting for them. But he told me that he had a brother doing the dyeing in another mill in North Carolina, and that he told him many times what a fool he was for not dyeing and boiling-off at the same time, and that his brother called him a fool for doing it that way. Both are successfully doing the work their different ways. Can they both be right? And that recalls to my mind a story I heard some time ago:

Mike and Jim had landed recently from abroad and were trying hard to learn to speak English. They were working together. When noontime came they stopped working and Mike wished to show Jim the progress he was making in English, and said: "Jim, I have bringen my lunch with me." Jim spoke up and said: "Mike, you have made a mistake; you should have said: 'I have bringed my lunch with me'; not, 'bringen.'" But Mike would not believe it, and offered to bet him half a dollar that he was right. Jim took the bet and they went to Frank, who had come from the same country but had landed a few boats earlier than the other two and was their boss. Frank listened to both of them, then laughed and put the money in his pocket, saying: "You are both wrong. You should say: 'I have brung my dinner with me.'"

It seems that the old saying that there is only one way to do a thing right does not hold good in the dyehouse. Why is it that every dyer does his work in a different way from every other dyer? There surely must be a limit somewhere where good work ceases to be good work unless it is done according to some rule. If silk is dyed successfully in a soap bath where the alkalinity is so much that it seems no neutral or acid color could stick and penetrate the silk part of the stocking, then we who use acid to dye that same part of the stocking must be entirely wrong. But I am here to state positively that we are doing it right; and I say to you, like Frank did: "You are both wrong; this is the way to do it."

New Developments in Vat Colors*

By Dr. Eugene Schwarz
General Dyestuff Corporation

FOR the first 20 years since the introduction of the vat colors, the range of these dyestuffs consisted chiefly of rather dull shades. They were fast but the brightness was lacking. The field of application, therefore, was somewhat limited. Later on, especially within the last 10 years, the research of the dyestuff manufacturers was directed particularly towards the production of bright colors of this class. The result of this work was the introduction of about 30 new vat colors, most of them being of remarkable brightness of shade. Not only bright are these new products, they mostly surpass the older brands in their fastness properties, especially fastness to light.

Although most of these new products are at present more or less introduced to the trade, I may be permitted to give you a general survey of them. I shall do this merely from the standpoint of the dyestuff manufacturer, giving you in brief their properties, field of application, and comparing them with the old brands. There is not much use in talking about the methods of application, for

*Delivered at the regular monthly meeting of the Rhode Island Section held October 26, 1928, at the rooms of the Providence Engineering Society.

little new has developed in the past years. I shall illustrate the new products with dyeings on rayon and cotton and also a few of them with prints.

I am sorry that I was not able to prepare everything better but the notice for this talk was rather short.

I shall go through the range of shades from yellow to black and start off with the greenest of the Indanthrene Yellows, namely Indanthrene Yellow 5GK.

This product is close in shade to the well known Anthraflavone (it is now called Algol Yellow GC), which it surpasses in fastness to light. It is a most useful product, especially for rayon, which offers many difficulties to the dyer. I also want to mention that it has very good affinity for silk. I would not recommend this color, however, for combination shades except with cold dyeing colors.

The most valuable addition to the range of Yellow Indanthrene colors is undoubtedly Indanthrene Golden Yellow GK, which was placed on the market about two years ago, and promptly proved to be a hit with the calico printers. It is well known that the Indanthrene Yellow G type oxidizes rather slowly and unevenly, causing all sorts of trouble. Nothing of this sort was experienced with Indanthrene Golden Yellow GK, which has become already introduced in the United States within the last year and a half.

According to the potash steaming process, the best method for this product, it yields golden yellow shades of particular brightness and of excellent fastness to chlorine. Its fastness to washing and light corresponds practically with the G type. This new product, however, is of less importance to the cotton dyer who will be more interested in a product which I shall mention later. I want to point out, however, that Indanthrene Golden Yellow GK should be of particular interest to the rayon dyer, since it produces a most beautiful shade of great purity. This product certainly deserves consideration on the part of the rayon dyer, inasmuch as its fastness to light upon this fiber is quite better than on cotton.

Additional Vat Yellows

I have said that the cotton dyer would be interested in a different product as a substitute for Indanthren Yellow G. This product is Indanthrene Yellow GF, close in shade to the G type but faster to kier boiling and washing. Although this is not a new product, it is the old Hydron Yellow NF, I thought I should mention it. It has, furthermore, the advantage of not in a different product as a substitute for Indanthrene Yellow G does.

There are two more new Indanthrene Yellows, which I would like to mention together, Indanthrene Yellow FFRK and 3GF. The FFRK was placed on the market about two years ago and represents the fastest to light yellow when dyed as a self-shade. It is somewhat brighter than the RK type. In other fastness properties, it is very similar to it. You might be interested to hear about a laboratory experiment which I made several months ago. It was early in spring when I recommended this Indanthrene Yellow FFRK to a customer who asked me for the fastest Indanthrene Yellow. He tried it out and found my statement correct but he wrote me that the shade was too red and not bright enough to be used for the shade he had to produce. He sent me his dyed shade and asked me to match it with an Indanthrene Yellow of the same fastness as the FFRK. As there is no greener yellow of the same fastness, the task was not easy. I thought that I could make the shade greener with a little bit of Jade Green or Indanthrene Brilliant Green 2G, but that did not brighten it up. However, I recollected the fact that Nekal BX when used in quantities of about ½ to 1 ounce per gallon in the hydrosulphite Indigo vat has the effect of brightening up the shade considerably. I hoped that the Nekal would do the same thing in this yellow shade and it really did.

Laboratory Trials on Nekal

I would like to show you three dyeings made with Indanthrene Yellow FFRK paste and shaded with Indanthrene Blue 5G, and Indanthrene Brilliant Green B, respectively, and Indanthrene Brilliant Green 2G, with and without Nekal. You will see that the dyeings with Nekal are not only brighter but also considerably stronger than the dyeings without it. These are only laboratory trials but I think that it would be worth while to try it in a large way and I hope that the piece dyers who are interested in this will make trials in the mill. It might be too expensive for yarn dyers, but I think in the jig it is absolutely feasible. The hydrosulphite consumption might be a little greater than usual but it must be remembered that this method gives effects which otherwise cannot be achieved.

Now I would like to say a few words about the 3GF. It is a well-known fact that the yellows have a destructive influence in regard to light fastness upon the blue in a green combination but this new yellow 3GF acts in the least destructive manner in such a combination. Wherever possible it should be the yellow part of any combination with Indanthrene Blues or blue-green or brilliant green. As a self-color it yields very clear greenish yellow shades and possesses very good all around fastness.

The Range of Oranges

In the range of the oranges, I would like to mention Indanthrene Golden Orange 3G, although this color has been on the market for about four years. In shade it is somewhat greener but brighter than the Golden Orange G and besides being of better value, it is faster to light.

There are two very important new additions, however, in the orange group, Indanthrene Brilliant Orange RK and very recently, Indanthrene Brilliant Orange GK. These two oranges represent the fastest to light vat oranges. The RK approaches the brightness of Hydrogen Orange, whereas the GK is yellower but, if anything, brighter. The light fastness of the GK brand is a bit inferior to the RK, but all of their fastness properties are very good. Both are excellent products for dyeing and printing of silk, cotton and rayon.

I am now coming to the reds, and draw your attention to Indanthrene Red BK, which has been on the market for quite a while. It is a little brighter and bluer than Indanthrene Red RK but its fastness to light is a trifle inferior. Where very fast pinks, especially weak shades, are required, this product should be used.

For bleachers of colored goods Indanthrene Rubine R should be of particular interest. It possesses a remarkable fastness to kier boiling, boiling soda, and washing. It is similar in shade to Indanthrene Red Violet RH, although a trifle duller. Its fastness to light, however, is considerably superior. It is a very level dyeing product and therefore suitable for combination shades.

In connection with Indanthrene Red Violet RH, I might draw your attention to a new product which is even brighter than the RH type. This new type is Indanthrene Red Violet 2RN New. It is distinguished by its fastness to kier boiling and washing, a fastness property which the RH does not possess. It is a beautiful dyeing and printing color. The method of application is the same as of the RH type.

You all know Eridan Scarlet R. This color has been taken over into the Indanthrene series under the name of Indanthrene Scarlet R. It is used in considerable quantities by the awning trade but it requires some experience to get the proper shade when dyed in the warp. For the sake of the people who are intending to use it I might say that the best method of applying this color is dyeing at high temperatures, 180° C., without any salt. The fastness to light, and especially the fastness to weather, has been found very satisfactory.

Another Indanthrene Scarlet has been put on the market, namely, Indanthrene Scarlet B. It possesses a brighter and bluer shade than the R and exhausts better than this type. Otherwise it possesses all the good properties of the former Eridan Scarlet. It is an especially useful product for printing.

There are two more pinks I would like to mention: Indanthrene Brilliant Pink R and B. They represent what was formerly known as Helindone Pink R and B Extra, or Hydron Pink FF and FB. Although dyeings of less than 1% are not Indanthrene Fast, it is well to remember that dyeings of more than 1% might be considered as such.

A Red for Rayon

There is also one more red, although it is not a very widely used one. I want to tell you about it, however, because of its good shade on rayon (on cotton it is a little dull). There is one interesting feature about this color. Although it is dull as a self-shade, when it is used for shading even the brightest oranges it brightens the shade up instead of dulling it down. This fact might be well to remember for certain cases.

I am coming now to the violets, to which we have five new additions. First of all there are Indanthrene Brilliant Violet 4R and 3B. These two colors represent the most brilliant ones of all Indanthrene violets, the 4R being the reddest and the 3B the bluest. Dyeing and fastness properties are the same as Brilliant Violet 2R. The 3B, however, is a better level dyeing product. They have the disadvantage of being sensitive to water spots just as Brilliant Violet 2R, and are therefore not recommended for piece dyeing. Where similar shades are desired for piece dyeing, I would like to draw your attention to three new products, namely, Algol Violet 2BN, BFN and RFN. These three new products have been brought out to substitute the old Hydron Violets BBF, BF and RF. Their fastness to light, of course, is not quite that of Indanthrene violets but it may be considered entirely satisfactory for most purposes. These new violets do not spot and are of remarkable fastness to washing and I am quite sure that within a short time they will be very well introduced for piece dyeing. They do not offer any difficulties as far as level dyeing is concerned and may also be used in combinations.

There are very few additions in the line of blue and I only want to mention Indanthrene Brilliant Blue 3G, which is a purified Indanthrene Blue 3G and shows naturally a somewhat more brilliant shade. Application and fastness are, of course, the same as for the 3G.

A new addition is Indanthrene Blue 8GK. The shade is similar, although not quite as bright as Hydron Sky Blue FK. It is only of interest as a

self-color because it does not dye very well in combinations. Its fastness to light is a little inferior to the other Indanthrene Blues and unfortunately its fastness to chemic is not quite satisfactory. So I do not think that this color will be of general interest, except for the dyer of rayon, on account of its good level dyeing properties.

Three New Greens

In the greens we have three very interesting additions: Jade Green, which is identical with Indanthrene Brilliant Green B, and Indanthrene Brilliant Green 2G and 4G, which two latter brands are derivatives of Jade Green, being of a more yellowish and still more brilliant shade. The fastness properties of the Jade Green are well known, so I only need mention that the 2G and 4G are very slightly inferior to light, whereas the other fastness properties are the same as of the Jade Green.

In the browns we have four new additions. First of all, Indanthrene Brown 5RF which, on account of its reddish cast, is a most unique shade of brown, applicable for all fibers and of excellent all around fastness. It is of equal interest for dyeing and printing and levels well straight and in combination. Indanthrene Brown BR is an interesting product for the production of deep browns of a blueish cast and should prove very interesting for the awning people. Its fastness properties are also excellent. Indanthrene Brown 2RD is a new product, a trifle redder than the old Indanthrene Brown RT. It is distinguished by its fluorescence, especially on silk, a property which no other vat color possesses in this degree.

I might mention here Indanthrene Printing Brown 3R, a somewhat redder product than the Indanthrene Printing Brown R, which you all know is a very useful color, intended for printing exclusively.

There are two odd colors I would like to present to you. They are Indanthrene Khaki 2G and Indanthrene Olive GN; the latter is the former Hydron Olive GN. I want to make special mention of their use for Government khaki shades, especially Indanthrene Khaki 2G, which is a very inexpensive product to use. It might interest you, however, that this is the only vat color known which has very poor affinity for rayon.

As for the blacks, there has been no new product but I would like to draw your attention to Indo Carbon CL Conc., which approaches Indanthrene Black in all around fastness but is very much less expensive to use. It is not a true Indanthrene Black but it belongs, according to its dyeing properties, to the sulphur colors.

Dyeing Bedsheets

Before I close my talk I would like to mention a new thing; that is, the dyeing of bedsheets with fast colors. All the new colors which I have mentioned would be very suitable products to use for this purpose on account of their fastness as well as working properties.

I want to show you a few shades which I have done in a mill. The blue shade was done with Indanthrene Blue GCD. Here I might remind you again of the use of Nekal BX. The material was given one run through a Nekal solution containing ½ ounce Nekal BX at a temperature of 160° F. and dried previous to dyeing. The result showed an improvement as to shade, level dyeing, and penetration, over the dyeing without Nekal, which I had done first.

The yellow is Indanthrene Yellow GF, which is especially suitable for goods which have to stand repeated washing, as in the case of bedsheets. The salmon was made with Indanthrene Brilliant Orange RK straight. The GK, however, might give a better shade. At the time the trials were made this product was not yet available. I have not seen this shade on bedsheets but it is used for colored borders. The green was made with Indanthrene Brilliant Green B and Indanthrene Yellow Brown 3G, the pink with Indanthrene Red RK and Red Violet 2RK and the lavender with Indanthrene Brilliant Violet RK and Indanthrene Korinth RK. I think the lavender shade could be produced in the same fastness but materially cheaper and with less difficulty with one of the new Algol Violets I have been telling you about.

Applicants for Membership

Active Membership

Maurer, Edward, chemist, Carbic Color & Chemical Company, New York City. Sponsors: E. J. Portner and John C. Zwaan.

May, Paul O., branch manager, Color Service Corporation, Chicago, Ill. Sponsors: A. T. Brainerd and Arch J. Mease.

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AMERICAN
DYESTUFF REPORTER
SAMPLE SWATCH QUARTERLY
Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.
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A PLEA FOR INTEREST

IF the textile industry will not get excited over its own problems, can we expect it to show much interest in the problems of the dye industry? Hardly. But there are issues which concern our dyestuff industry that lie very close also to the interests of the textile manufacturers and of these none is more close than the issue of tariff protection. This has now been revived and it is to be hoped that the textile industry will not merely await the outcome passively but will show a lively interest in every effort made for protective tariff rates on dyes.

The importance of protecting the American dye industry is an old story to most textile men. Why repeat it here? Somebody might ask irritably, What! isn't that dye industry protected yet? But the world moves, conditions change, and tariffs become antiquated—yes, even in the six years since the Fordney-McCumber Act was passed.

Those who designed that 1922 tariff did a very good job for the dye industry, as Dr. Killheffer told the Ways and Means Committee at its hearings in Washington two weeks ago. It filled a great need at a crucial period in the industry's development. But the original ad valorem rates on dyes and other coal tar products in the 1922 bill were in force only two years when, by the provisions of the act, they were reduced 15 per cent.

What is the situation to-day? The time has come for readjusting the American tariff. Many industries believe higher rates are needed on some schedules; other interests seek lower rates. The need for intelligent revision has long been recognized by Congress, and hearings are even now in session before the Ways and Means Committee of the House. Witnesses representing the chemical and dye industry submitted their arguments to the committee and filed their briefs January 7 and 8, and from now until the day Congress passes upon the desired revisions, the dye industry will be following keenly every step of the proceedings. Is it not reasonable to ask the textile interests, therefore, to become informed on the issue and to stand ready should their co-operation be required to support the dye industry's case for more adequate protection?

This job of getting the right sort of protection for the dye manufacturers does not call merely for the drafting of a brief to be delivered, amid some speechmaking, to the Ways and Means Committee, and then for patience and hope. It cannot be done so easily as that. There is more than Congressional red tape between the hearings held two weeks ago and the final passage of a tariff bill embodying the right sort of protection for the industry. There is an opposition to be reckoned with, and that opposition will naturally attempt to stir up as much sentiment as possible in Washington against the arguments for protection advanced by our dye manufacturers.

Because of this active opposition there is need for vigilance; and since the textile industry has always reaped the benefits of a strong home dye industry and will continue to reap those benefits, it is, we believe, only fair that the textile industry should help keep the vigil.

THE DYE INDUSTRY PRESENTS ITS CASE

OUR chemical and dye manufacturers are very seldom inclined immodestly to slap their own backs. Some of them have had reason to indulge in mild back-slapping parties with the publication each year of the Government's Dye Census showing the steady technical development of their industry and equally steady reduction of prices to consumers of their products. We believe they now have another reason for patting themselves: the men they sent to Washington to represent them at the tariff hearings a couple of weeks ago were exceedingly well informed.

In the parlance of the street, they knew their stuff and were therefore able to inform the Committee on Ways and Means upon the tariff needs of their industry. And they did so in testimony that included practically every sound and logical argument in support of more adequate protection. They made out a very strong case, for they fully realize how much depends upon posting with the proper facts those who will draft the next tariff bill.

So far as the rates on dyes and other coal tar products are concerned, the needs of the industry are extremely simple; and they were simply explained by Dr. Killheffer in the first few paragraphs of his testimony. They call for an increase in the rate of the basket clause of the chemical schedule and for a return to the original rates of paragraphs 27 and 28 covering coal tar chemicals and finished colors.

The real significance of the basket clause was rightly stressed in the brief filed with the tariff committee and in these words:

> The chemical industry the world over is making

revolutionary strides from day to day. In many instances what is new to-day is by reason of this rapid and in many cases unexpected progress, old to-morrow. In these circumstances new products never before known or for which there was little or no use formerly, become suddenly of great importance. Not being specifically provided for they fall in the basket of paragraph five and the 25 per cent ad valorem rate gives little or no protection.

In the same way the significant element in paragraphs 27 and 28 was emphasized as the use of the *American selling price* rather than the United States or foreign value in assessing the valuation of those foreign products that compete with domestic dyes and chemicals. To this device, it was pointed out, is due "most of the protection afforded by those paragraphs." It is likely to be a confusing point to many. The distinction between the terms is extremely important and was clearly made in the brief: "American selling price means the selling price in the markets of the United States of the American-made product. United States value—this expression is really a misnomer. It does not mean that duty is assessed on the selling price in the United States of the foreign-made goods. What it does mean is that from this selling price in the United States of the imported merchandise a number of deductions are made, as follows: 16 per cent for profit and expenses; 3 cents for freight and insurance; 7 cents for specific duty; 45 per cent for ad valorem duty; and then on what is left the ad valorem and specific duty is calculated."

That this method of assessing imported competitive dyes is the bone of contention between domestic dye manufacturers and importers was brought out in the testimony of Dr. Pickrell representing the General Dyestuff Corporation. The issue is an important one and more space will be devoted to it in these columns later. It is sufficient at this time to urge that some thought be given to the matter by our readers, that they may understand just why the American selling price as the basis for valuation is unquestionably the best for the protection of our dye industry. As Dr. Killheffer explained, any change in the basis of valuation would mean that an entirely different set of ad valorem rates and specific duties would be necessary.

After all, the main desire and the real need of the dye manufacturers is adequate *protection*, and this need should certainly not be obscured behind inky clouds of technicalities.

One more important point was revealed in the questioning of the dye industry's witness by the more inquisitive members of the Ways and Means Committee. Much has been heard about the flexible provisions of the tariff. It is commonly known that under these provisions the President has the right to lower or increase tariff rates on any products, if necessary up to 50 per cent—any products, that is, *except* dyes and coal tar chemicals, for paragraphs 27 and 28 are excluded from the privilege of this protection. As Dr. Killheffer explained, applications can be made to reduce rates on dyes but not to increase.

The tariff needs of the dye industry were, in this manner, very clearly and simply expressed at the hearings. The basket clause rate should be increased, the original ad valorem rates of paragraphs 27 and 28 restored to 55 and 60 per cent. Nothing about these needs is complicated. What did require further argument, however, were the reasons why the industry needs such added protection. Those also were explained very clearly at the tariff hearings.

The first reason is that the rates now in force are inadequate. This can be proved. They are inadequate when viewed in relation to present conditions in the dye industry and to its future prospects. They are inadequate because of the tremendous differences in the labor costs and the cumulative experience of our foreign competitors, who are organized into powerful cartels and who thus produce and sell efficiently in markets protected by trade agreements. In the case of the coal tar chemical and dye clauses of the tariff, the rates in force are inadequate especially in the higher priced, higher grade products, such as vat dyes. That fact became evident when the rates automatically dropped 15 per cent in 1924. In the five-year period from 1922 to 1927 a quantity varying from 38 to 49 per cent of the total poundage of all dye imports was in the vat dye field alone.

To quote again from the brief filed at Washington, "In this field of higher-quality products lies the future of the industry. . . . We are asking for a definite advantage for the American manufacturer so that development in this important field of faster dyes and higher grade products generally may go forward more rapidly."

Now, the second reason why the industry must have more adequate tariff protection is directly related to this development in fast dyes in which our industry believes its future progress will lie. The second reason is that the demand here among textile consumers for faster colors will increase if prices on the higher quality dyes can be reduced. Prices to consumers *will* be reduced if the dye industry is assured of the minimum of competition in the home market from the foreign cartels.

Very significant, in this respect, is the point brought out during the tariff hearings that the United States industry now produces only about 25 per cent of all the different varieties of dyestuffs used in our mills, although at present that percentage represents over 90 per cent by volume of our dye consumption. Such a condition cannot last much longer, however, because of the growing demand for faster dyes, most of which we are now able to make, but not to sell profitably in the face of competition from abroad. This situation can be remedied only by placing a reasonable check upon the foreign products until such time as we are in a position to produce them at tonnage prices, to supply a tonnage demand.

The third reason for more protection for the domestic

dye industry is that the industry has become, since its birth ten years ago, of rapidly increasing importance as a national asset. This reason is understood too well by our readers to require any supporting arguments. The brief filed with the tariff committee emphasized at great length the key position of our synthetic organic chemical industry and that emphasis was surely not misplaced. Every man in Washington who has a finger in the tariff revision pie must be convinced that because of its intimate relation to national defense, to scientific research in medicine and in chemistry in general, and to the needs of other domestic industries, our dyestuff industry is one of the country's most indispensable units.

With the tariff needs of the dye industry couched in the clearest terms, and with the soundest arguments to support those needs, the case for more adequate protection has been presented. May judgment and fairness and intelligence and patriotism guide those who are to control the destiny of the next tariff, for they hold in their hands far more than the destiny of a tariff.

NEW FOREIGN RAYON JOURNAL

A COPY has come to our desk of the first issue of Jentgen's Artificial Silk Review, a handsomely bound publication of some fifty-six text pages devoted to the manufacture and processing of rayon and containing a number of excellent technical articles, some of which are well illustrated. The contents of this new publication, which is published by H. Jentgen, of Manchester and Berlin, is grouped under the following subheads: Production of Artificial Silk; Dyeing, Finishing, Etc.; Knitting; Weaving; Technical; and General.

The articles in the section devoted to dyeing and finishing in this first number of the journal comprise the following titles: Indanthrene Dyes on Artificial Silk; Colorability and Textile Value of Artificial Silk; The Dyeing of Umbrella Materials; The Dyeing of Artificial Silk and Cotton Hosiery; and the Dyeing of Rayon Under Consideration of a Mild Luster.

It is to be regretted that apparently no definite policy has been established with regard to the use of the term "rayon" in most European countries and among most foreign textile trades. The term "artificial silk," now obsolete in the United States, seems generally to be preferred to the newer name.

To judge from the make-up and contents of its first number, Jentgen's Artificial Silk Review promises to assume a leading place among the technical textile journals of the world.

TEXTILE CHEMISTRY COURSE AT NEW YORK SCHOOL

DYERS and other textile mill workers in the metropolitan district who are desirous of increasing their technical knowledge of dyes and fibers should be very much interested in an announcement made last week by the Evening Textile School, of 124 West Thirtieth Street, New York. This school is now offering a course in textile chemistry for which there is no tuition charge. The class meets Tuesday and Thursday evenings from 7 to 9 o'clock.

The course will cover the principles of textile chemistry in general and its outline includes the following topics: Identification of all the common textile fibers, including the rayons; special treatments applied to fibers; mercerization of cotton; effects of different chemicals on the fibers; the application of finishes.

Related subjects such as the constitution of soaps, the use of sulphonated oils and other chemical products in processing, and the study of water will also be touched upon during the course.

A second course will also be offered on the quantitative chemical analysis of textiles and assistants, this to be known at the school as Textile Chemistry II. Both courses are likely to cover subjects of interest, not only to textile plant operators, but also to those employed in laundries, dry cleaning plants, bleacheries and general industrial laboratories. The instructor is Sydney Springer.

GRANDAGE VICE-PRESIDENT OF CLARK THREAD

HERBERT GRANDAGE was recently elected a vice-president of the Clark Thread Company, of Newark, N. J. He has been connected with the mill for the past seven years, accepting his first position there in 1921 as superintendent of bleaching, mercerizing and dyeing. About two years ago Mr. Grandage was appointed general manager of both Newark and Bloomfield works.

Mr. Grandage came to this country from Bradford, England, at an early age, descendant of a long line of dyers centered about the old English textile center. After graduating from Philadelphia Central Manual Training High School, he attended the Philadelphia Textile School and later Pratt Institute of Brooklyn. Following two years as dyer at the Industrial Dyeing & Finishing Company, of Frankford, he resigned to become laboratory assistant and color matcher for Read, Holiday & Sons in New York. Later he accepted a position with the Bay State Thread Works, of Springfield, Mass., as superintendent of bleaching and dyeing, where he remained until 1919. For the next two years he was superintendent of bleaching and dyeing for Gerald Cooper, Providence, R. I.

He has been a secretary and a chairman of the New York Section of the American Association of Textile Chemists and Colorists and active in other ways in advancing the interests of the dyeing profession.

MERCERIZATION OF RAYON PULP

(*Continued from page 54*)

liquor concentration is nevertheless very unequal and is characteristic for each alkali. In the next place in all cases up to 1 Mol there is a rapid increase of swelling to be observed. In the case of LiOH between 1.1 and 1.9 Mol a very slight increase in the number occurs. From 2 to 2.8 Mol the curve rises sharply to the maximum value and then drops with equal rapidity to 3.6 Mol to maintain subsequently a horizontal line. Before and after the swelling maximum there are therefore two intervals of rest between 1 and 2 Mol as well as over 3.5 Mol and higher, in which the swelling number is scarcely changed.

In the case of NaOH the swelling number rises quickly at first, then more slowly, but always constantly, to the maximum at 3.15 Mol; falls quickly again to 4.5 and remains nearly constant to 6.8 Mol. The curve then declines to 10.5 Mol to run a second interval of rest in the horizontal direction. Here, too, there are two very distinct intervals of rest, both lying after the swelling maximum and consequently having a greater expansion than in the case of LiOH.

With KOH corresponding to its minimum swelling tendency, the curve from the beginning rises not so sharply and becomes more level from 2.3 to the highest swellig number at 3.8 Mol. It falls then considerably to 5.4 Mol and remains, apart from a gradual decline of the swelling number, in a horizontal position until the highest concentration is reached. An interval of rest, therefore, occurs after the swelling maximum.

This run of the swelling, which is characteristic for each alkaline hydroxide, shows itself in the case of all pulps. The different stocks differ from each other only in the degree of beating, since a slow pulp shows the maximum swelling, while the medium strong shows a moderate, and the short pulp the minimum, swelling.

The initial run of the swelling is recognized by a rapid degree of swelling immediately after the penetration of the liquor. Even after a few minutes a state of equilibrium is established and the swelling value changes scarcely at all in the first hour. First after twelve to fifteen hours there is a further slow increase until the maximum is reached, which is constant for eight hours, to return at the same rate to the initial value at the end of twenty to twenty-four hours, which is reached in about thirty hours, where it undergoes no more change. The difference between the initial and maximum value amounts at the most to a quarter of the first and is exactly related to the degree of beating of the stock. The characteristic of the swelling during a run agrees therefore in all respects with the curve of the mercerization losses.

The initial characteristic of the run may be seen from the swelling curve for LiOH, NaOH and KOH, which has a greater significance, if the consumption of alkali during mercerization is calculated. Following the methods of Vieweg and Dehnert the various pulps were tested for the alkali taken up by titrating the mercerization liquor before and after the immersion of the stock.

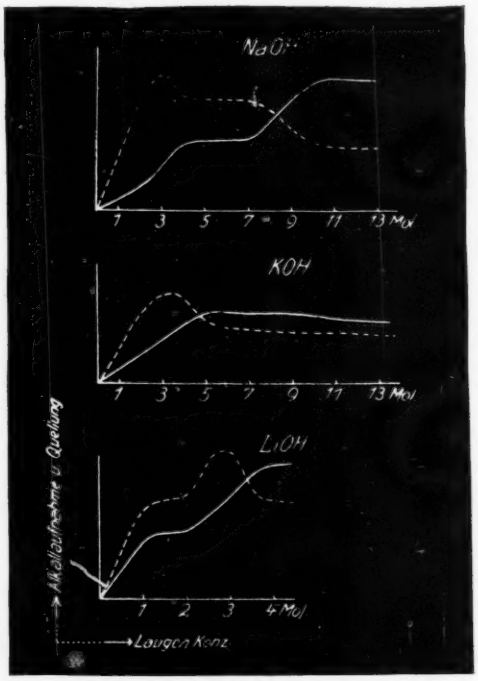


FIG. 6

The amount of NaOH taken up with an increasing concentration of the liquor does not correspond to a pure adsorption, since two very marked intervals of rest occur, the first lying between 3.7 and 6.8 Mol which represents a molar ratio of 2 Mol of pulp to 1 Mol of the base. The second interval extends beyond 10 Mol up to the maximum concentration of the liquor and reaches the ratio of 1 Mol of cellulose to 1 Mol of the base.

The ratio whereby LiOH is taken up is quite analogous. The first interval is between 1 and 2 Mol of liquor with the stoichiometrical relation 2:1, the second over 3.5 Mol with the relation 1:1. With KOH, on the other hand, a single rest interval occurs when the concentration of the liquor is over 5 Mol, which represents a ratio of 2 Mol of cellulose to 1 Mol of the base. This result is therefore in complete agreement with the results of Vieweg and Dehnert. In all probability these alkaline cellulose compounds are to be considered as typical addition compounds with the following structure:

$(C_6H_{10}O_5)_2.NaOH$, $(C_6H_{10}O_5)_2.KOH$, (CHO). LiOH, and $[(C_6H_{10}O_5)_2.2NaOH]$ and $[(C_6H_{10}O_5)_2.2LiOH]$

If the experimental values are partially higher than the theoretical, the fact may be explained by the adsorption which occurs at the same time, the amount of adsorption increasing with the degree of beating. In the case of a short pulp the amount of alkali taken up lies nearest to the theoretical value (I), it rises then above C (medium strong stock) and falls below the slow pulp (B).

Usual run of the taking up of the alkali: After about half an hour an equilibrium takes place between the pulp and alkali, which remains constant for several hours. Subsequently during the run an increase of alkali occurs, which, however, is slight and reaches its maximum height after twelve to twenty hours. It then declines at the same rate, and after thirty hours complete equilibrium between cellulose and alkali is established. The reduction of the amount of alkali does not vary in the two rest positions under stoichiometrical conditions, but expresses the theoretical value more exactly than in the initial period. It is therefore a question merely of an increase and decrease of adsorption running parallel to the change in swelling.

An important proof of the exactness of the alkali adsorption curve in the rest intervals is the swelling during the run. In the subjoined diagram (Fig. 6) the black line represents the amount of NaOH, KOH and LiOH taken up with increasing concentration of the liquor, the horizontal line shows the molecular relations, and the plotted curve the condition of swelling and the base concentration at different periods of swelling.

These curves show a marked parallelism between the curve of swelling and that of the alkali adsorption and, further, in nearly all instances the swelling maximum lay with a liquor concentration of almost exactly 3 Mol per liter. This parallelism is, in our opinion, a proof of a chemical or, at all events, a molecular union between pulp and alkali.

KLIPSTEIN HANDLES PEERLESS DYES

All dyes manufactured by the Peerless Color Company, of Plainfield, N. J., are now being distributed through A. Klipstein & Co., New York, from the various warehouses and branch offices of the latter firm. This arrangement went into effect on the first of this year, and in announcing the change the Peerless company state that it will enable them to serve their customers more efficiently and promptly in the future. The products will continue to be sold under the Peerless trade-mark but all orders will be handled through Klipstein.

The Boston branch office of John Campbell & Co. has been moved to larger and more convenient quarters at 99 Bedford Street. The telephone number is Hancock 6873.

UNITED STATES LEADS IN FURS

Output of Establishments Shows Fivefold Increase Since Pre-War Period

The remarkable growth of fur manufacturing in the United States is revealed in a survey of the industry by T. J. Biggins issued by the Commerce Department. Between 1914 and 1925, the report shows, the number of establishments engaged in the manufacture of fur goods, exclusive of felt hats, increased from 1,300 to 2,000; the total number of wage earners advanced from 9,000 to 17,000, while the wholesale value of their aggregate output rose from $44,000,000 to $254,000,000.

The Mississippi Valley, it is pointed out, is the largest fur producing area in the world and it is due to the large catch in this region that domestic production each year amounts to between $65,000,000 and $70,000,000. This is about double the catch of Russia and considerably more than three times that of Canada. In addition to the furs gathered in the United States proper, the value of the annual fur collection of this country is augmented each year by more than $4,000,000 worth of furs from Alaska.

The domestic fur production of the United States is by no means sufficient to meet the demands of the country, however, and it is necessary to import pelts from all parts of the world. How widely distributed this import trade is may be seen from a study of the statistics which show that of annual imports aggregating $136,000,000 only six countries supply furs valued at more than $5,000,000.

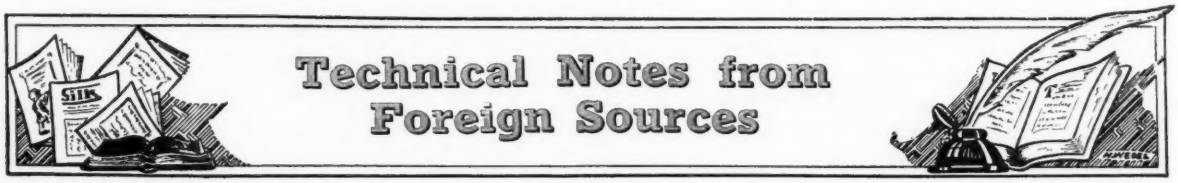
During recent years a larger export trade in raw furs has developed in this country, the 1927 shipments having a value of $31,000,000. The principal destinations of these exports are the United Kingdom, Canada, Germany and France.

There are many types of fur-bearing animals in the United States to-day but the collection of pelts from some of them is so small that they do not figure in trade to any great extent. The four outstanding commercial furs are muskrat, opossum, skunk and raccoon. The production of these furs varies little from year to year. The total annual collection of muskrat pelts is estimated at about 12,000,000, that of skunk from 7,000,000 to 8,000,000, while the collection of raccoon pelts ranges from 600,000 to around 1,000,000.

During recent years, according to the survey, there has been a marked development in fur farming in this country. Successful raising of foxes has been carried on for a number of years and at the present time practically all of the silver and black fox pelts used in the trade are from domestically bred animals.

EUGENE MINOR TAYLOR

Eugene M. Taylor, for thirty years sales manager of Michigan Alkali Company, died at Miami Beach, Fla., on December 28.



Modern Procedures for Preparation of Finishing and Sizing Agents

Dr. Rudolf Konrad, Zeitsch. fuer Farben-Ind. 181, 20 (1928).—A valuable paper dealing with the more recent methods of preparing starch and mixed pastes, so as to give them greater penetrating and wetting-out powers, by increasing the degree of dispersion of the starch, etc., particles. While not a subject directly connected with dyeing, the paper is so suggestive that it seems worthy of translation.

In the introductory paragraphs the author, after speaking in general of the properties of starch, of passing to "starch-paste" when stirred with water, and then mixed with hot water, goes on to say that "one speaks rather of a colloidal solution, and thereby expresses the fact that the individual particles of starch, swimming about in the water, have not yet assumed the conceivably smallest dimensions. There is, rather, still a certain number of starch molecules, united into more or less large molecular complexes, whose dimensions are still so great that they are not in condition to pass through a membrane, which actually dissolved particles—the so-called crystalloids—do very easily. We evaluate the colloidal character of a solution through its degree of dispersion; that is, the degree of subdivision in which the separate particles of the colloidally dissolved material exist within the solvent. So that the more highly dispersed the material in a colloidal solution, just so much more nearly does it approach the character of a true solution.

The transformation of starch into the highly dispersed condition takes place only by treatment with certain chemical substances or by the action of certain ferments, whereby the starch molecule is degraded or partially hydrolyzed through the taking up of water in a chemical way. This procedure is called "opening up" the starch. Such opened-up starch possesses, in contrast to ordinary starch in the ordinary paste condition, an extraordinarily heightened penetrative power. As a result, it imparts to cotton and linen goods, besides a certain softness, a more grainy and stiffer feel, since it penetrates better into the inside of the fiber. As a result of its slight covering power, it leaves luster and color unaffected in the case of solid-dyed dark goods. It has the power of very easily taking up mineral additive substances, such as are put in to get a certain filling and weighting effect in the finishing material, and of holding such substances, as well as most other substances used in finishing, so that during use a separation of the components can take place less easily than with ordinary starch-paste mixtures. It is specially suitable for fine finishes, since it can be diluted as much as desired, and when applied by rollers spreads very evenly.

A certain "opening up" of starch is attained merely by treatment with a suitable emulsifying agent, which is able to change over the thick paste of concentrated starch solutions into a more fluid and more workable form. Such an emulsifying agent is on the market under the name perpentol. It is a preparation which owes its characteristic properties chiefly to its content of tetrahydronaphthalene, a hydrocarbon which can, under suitable conditions, form the finest emulsions, and in doing so can exert a quite specific action upon the substances coming into contact with it. From 3 to 5 g. of Perpentol B or E per liter of bath are enough to change the starch to the desired form. The starch is stirred up with water, the perpentol added in emulsified form, the mixture heated by direct steam, and finally thus heated to boiling. If the perpentol has already been used to emulsify fatty substances, as parffin, wax, tallow, etc. (see later), any special addition of perpentol is unnecessary, since the emulsion containing it, stirred into the starch paste, has a sufficient effect along the desired line.

If a furthergoing "opening up" of starch is desired, the use of sodium perborate is to be recommended. This procedure depends upon the oxidation of the pasted starch by the excess oxygen, so to speak, of the perborate, set free through heating. The great advantage of this reagent is that a too radical cleavage of the starch molecule need not be feared, since only the amount of oxygen is set free by the amount of perborate used can enter into reaction (and the perborate can, of course, be weighed exactly). One-half per cent of sodium perborate is needed, reckoned upon the weight of the starch. For 1 kilo of potato starch, therefore, about 10 to 20 g. of sodium perborate will be used. The starch is first stirred up cold with five to ten times the amount of water and the requisite amount of perborate added; during the process care must be taken that no lumps settle out on the bottom. Heating is best carried out with direct steam. First the mixture is warmed to 60 to 70° C., then the temperature raised slowly to boiling; the paste changes to a glassy, transparent fluid (loses its opalescence largely), and one shuts off the steam as soon as the mass runs off "short" from the stirring stick.

Obviously, both the above methods, the use of perpentol and of perborate, can be combined.

It is frequently of advantage to increase still further the wetting and penetrative power of the starch bath; for example, in the sizing of raw yarn, the finishing of very thick weaves, etc. In this case it is recommended to add

to the starch paste to be "opened up," at the same time as the perpentol or perborate, one of the modern wetting-out agents, like Oranite B. The oranites contain, among other components, alkylated naphthalene-sulphonic acids, which possess to a marked degree the power of decreasing the surface tension of their aqueous solutions, and so of aiding the penetration of the liquid into the capillary interspaces of textile fibers. To the starch paste is added, besides the chemicals mentioned, 0.5 to 1% of Oranite B (reckoned on the weight of the starch); all else is the same. Into the starch solution thus prepared the carefully emulsified fatty additions, or, according to the kind of finishing, the oils, salts, glue and loading agents, are stirred, and then the finishing is carried out in the usual way, the mixture having been brought with hot water to any desired lower concentration.

The uniformly fine subdivision of the fatty substances in the paste does, however, almost always cause certain difficulties. But it is possible to obtain, more easily and satisfactorily, the desired finishing or sizing effect the more finely the paraffin, wax or tallow is emulsified in the bath. Of course, fats, paraffins and waxes are added to the paste with the purpose of getting quite specific effects in feel, luster, flexibility, elasticity, waterproofing, etc. Here the use of perpentol offers the finisher the possibility of attaining most perfectly, in a convenient way, the desired result according to the fatty substance selected, since all was emulsified with perpentol penetrate easily and uniformly into the very interior of the fiber as a result of their extremely fine state of division.

The hydrocarbon contained in perpentol is capable of forming emulsions of such fineness that the individual droplets of tetrahydronaphthalene in perpentol exhibit the Brownian movement observed in colloidal systems. The high degree of dispersion thus evidenced explains the great dispersive ability of perpentol emulsions. In addition (and this is especially true of Perpentol B), perpentol has the power, on emulsification in water, of emulsifying at the same time other substances previously dissolved in water, and of converting them thereby, also, into the finest conceivable state of dispersion. The average diameter of the emulsified tetrahydronaphthalene globules is about 1 microm (0.001 mm.), so that, for example, in each cubic centimeter of a concentrated perpentol emulsion there are contained about 1.9 billions of perpentol droplets.

We now add more exact directions for its use: For two parts wax, paraffin, etc., about one part Perpentol B is needed. For example, 5 kilos of wax or paraffin are melted and stirred up with 1 kilo of Perpentol B. Separately, 1.5 kilos of Perpentol B are stirred up with 10 to 15 liters of hot water by stirring gradually the water in small amounts into the Perpentol B. A fine white emulsion is thus obtained, which is added in portions, with continuous, rapid stirring, to the melt of wax and Perpentol B already prepared. The white paste obtained is miscible in any proportion with warm or cold, neutral or alkaline baths, and can be added to any finishing bath without any special preparation. Separation of wax or paraffin on cooling of the bath does not take place. If, on long standing of the bath, a slight separation of "cream" takes place, it is necessary merely to stir up the bath well in order to obtain it ready for use again.

In many cases hard water has to be used, or sufficient condensed water is not available. In such a case it is best to boil up the water needed for the perpentol emulsion with an amount of soda sufficient to soften it. For each degree (German) of hardness and about 100 liters of water approximately 2 g. of soda ash will be needed. The calcium compound scum which rises to the surface is skimmed off.

Perpentol has, further, the property of depressing the melting point of paraffin, wax, fats, etc., so that the bath can be used at a temperature somewhat below that at which the fatty substance would of themselves remain fluid. A practical example may be given: As a finishing mixture for iron yarn, 30 kilos of potato starch are pasted up in 150 liters of soft water, stirred up with 0.3 to 0.5 kilo of perborate, and by blowing in of live steam pasted as previously described. Meanwhile 300 g. of beeswax, 600 g. of tallow and 400 g. of paraffin are melted together, and to the melt 250 g. of Perpentol B are added. Into a further 400 g. of Perpentol B, 3 liters of hot, soft water are stirred gradually, and the milky emulsion formed is stirred little by little into the perpentol-wax-paraffin melt. The fine white paste thus formed is diluted by gradual stirring in of some of the starch paste already prepared, and this mixture is then stirred into the rest of the starch paste. The whole mixture is brought to 200 to 250 liters with warm, soft water.

A finish for knitting-yarn numbers of 12 to 26 is prepared from 8 to 10 kilos of potato starch, 80 to 100 g. perborate, 200 to 250 g. fatty substance and 100 to 125 g. of Perpentol B; total bath 100 liters. For yarn numbers of 26 to 50, 5 to 8 kilos of potato starch, 50 to 80 g. of perborate, 250 to 300 g. of fatty substance and 125 to 150 g. of Perpentol B; total bath 100 liters. With increasing yarn number the starch is therefore diminished, while the fat content, consequently the Perpentol content, is increased.

The author closes by pointing out the advantages of the finisher knowing the constituents of his paste so that he can vary the effect, as desired, rationally, by proportional alteration of the significant components, instead of depending upon commercial mixtures of secret composition, which also contain a large amount of water, which has to be paid for.

RAYON YARN TABLE

A table has been issued by James W. Cox, consulting textile specialist, of New York, giving denier and filament number of the American commercial rayon yarns on the market.

POLAND USING MORE DYES

United States exports of dyes to Poland are increasing, according to the Chemical Division of the Department of Commerce. Official statistics show that only $700 worth of coal-tar colors, dyes and stains were shipped to Poland and Danzig during the five-year period 1923-26, while during the ten months' period of 1928 exports of these products increased to over $37,000.

Poland manufactures very small quantities of dyestuffs and is a large importer of these products from Germany and Switzerland. The annual consumption of dyestuffs is estimated at 2,500 tons of normal concentration which would equal approximately 1,250 tons of dyestuffs of highly concentrated export type. Poland's imports of dyestuffs average 500 to 600 tons of highly concentrated types per year. Domestic production is almost entirely limited to dark dyes (black, dark blue and brown). According to types, imports of dyes into Poland are subdivided as follows: sulphur dyes, 10% of the total; direct dyes, 45%; wool black, 10%; lake dyes, 15%; basic dyes, 2%; other dyes, 17%.

Imports of synthetic, alizarine and aniline dyes into Poland during the first eight months of last year amounted to 271 tons, and of organic coloring compounds, not separately designated, to 547 tons as compared with 111 tons and 483 tons, respectively, imported during the corresponding period of 1927. Naturally, these figures are not comparable with the average annual importation mentioned previously, since official statistics do not mention the concentration of the dyes imported.

DR. FLYNN APPOINTED TO HEAD FINISHING COMMITTEE

Dr. O. R. Flynn, chief chemist of the Waldrich Bleachery, Delawanna, N. J., has accepted the chairmanship of Subcommittee XXII on Textile Finishing and Finishing Materials of Committee D-13 of the American Society for Testing Materials.

Dr. Flynn acted as temporary chairman of the organization meeting of this subcommittee in Washington in connection with the fall meeting of Committee D-13.

W. H. Whitcomb, chairman of Committee D-13, has asked for word from those who will be interested in participating in the work of this new subcommittee.

BUREAU RESEARCH PAPERS ISSUED

Reprints of a number of articles of interest to dyestuff and textile chemists that appeared originally in the Bureau of Standards Journal of Research have been issued by the Department of Commerce. Three of these recently received are: "Effect of Twist on Cotton Yarns," by A. A. Mercier and Charles W. Schoffstall, of the Bureau (Research Paper No. 27); "Effect of Temperature Change on the Color of Red and Yellow Lovibond Glasses," by Deane B. Judd, associate scientist of the Bureau (Research Paper No. 31), and "Equipment for Routine Spectral Transmission and Reflection Measurements," by H. J. McNicholas (Research Paper No. 30). These papers are all illustrated with graphs and diagrams.

DENIEROMETER INSTALLED

The Textile School at Clemson College has installed a Richard Denierometer, a new, very novel instrument for obtaining the denier of all varieties of textile yarns, even in very short lengths.

This instrument, the first of its kind in America, is the product of the Societe Chimique des Usines du Rhone, an associate of La Societe pour la Fabrication de la Soie "Rhodiaseta," manufacturers of "Rhodiaseta" brand acetate silk, in order to study the regularity of denier of Rhodiaseta silk, and is, therefore, particularly adapted for use on rayon and true silk.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

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Available immediately as dyer or chemist. Extensive experience with vat colors on all types of fabrics, also rayon and mixtures. Experienced in analyses, chemical control, and experimental and development work. Address: Classified Box 489, American Dyestuff Reporter.

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Seeks an opportunity in mill or laboratory. Competent in processing warps and skeins, mercerized cotton and rayon with direct, sulphur, developed and vat colors. Dyer and foreman in large mills for fifteen years. Knows textile chemistry. Good references. Address: Classified Box 497, American Dyestuff Reporter.

SALESMAN WANTED

Old established firm manufacturing chemicals and chemical specialties is desirous of securing an experienced salesman for the exclusive handling of its products throughout the Southern textile territory. Will consider only those of established standing. In answering, state experience definitely. Correspondence will be treated confidentially. Address: Classified Box 498, American Dyestuff Reporter.

FOR SALE

Lot of colors, different shades, surplus and discontinued stock of a large textile mill. Will be sold as one lot or in desired quantities to responsible buyers. Address Box 340, American Dyestuff Reporter.